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ORIGINAL ARTICLE

Hematological Profiles in Women with Lipedema: Exploratory Analysis of Platelet Distribution Width and Mean Platelet Volume.

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Abstract

BACKGROUND: Lipedema is a chronic adipose tissue disorder predominantly affecting women, often misdiagnosed as obesity or lymphedema. Emerging evidence points to microvascular dysfunction and chronic inflammation in its pathophysiology. This study aimed to compare complete blood count (CBC) parameters and derived inflammatory indices between women with lipedema and age-matched healthy controls, focusing on the potential diagnostic value of platelet indices such as PDW and MPV.

METHODS: We conducted a retrospective observational study including 45 women with clinically confirmed lipedema and 40 age matched healthy controls. CBC parameters and derived inflammatory indices were compared between groups without adjustment for body mass index (BMI).

RESULTS: The study included 45 women with lipedema and 40 healthy controls with similar age distributions. No statistically significant between group differences were observed in complete blood count parameters after correction for multiple comparisons, although PDW and MPV were numerically higher in the lipedema group.

CONCLUSION: In this exploratory study, PDW and MPV were numerically higher in women with lipedema than in controls, but these differences lost statistical significance after correction for multiple comparisons. These findings argue against PDW or MPV as standalone diagnostic markers of lipedema and indicate that future research should prioritize larger, BMI-matched cohorts and multimodal approaches that integrate platelet indices with tissue-level or imaging markers.

INTRODUCTION

Lipedema is a chronic, progressive adipose tissue disorder that is almost exclusively diagnosed in women (Poojari *et al.* 2022). Patients typically present with symmetrical enlargement of the legs due to fat deposition in the lower extremities and often report tenderness and easy bruising, leading to significant physical discomfort and psychosocial burden (Carvalho, 2024; Daftuar *et al.* 2023). It is often misdiagnosed as obesity or lymphedema, leading to delayed or inappropriate treatment (Bowman & Rockson, 2024; Buck & Herbst, 2016).

The pathophysiology of lipedema remains incompletely understood (van la Parra *et al.* 2023). Hormonal and genetic factors likely interact with microvascular dysfunction, low-grade inflammation, and metabolic disturbances to drive disease expression (Eakin & Peterson, 2023; van la Parra *et al.* 2023; Yalcinkaya *et al.* 2025). Histopathological analyses of lipedematous adipose tissue demonstrate increased vascular permeability, macrophage rich perivascular infiltrates, and extracellular matrix remodeling, changes that can promote adipocyte hypertrophy, fibrosis, and microvascular dysfunction and may help explain the development of pain and edema (Allen *et al.* 2020; Felmerer *et al.* 2020a; Felmerer *et al.* 2020b).

CBC derived inflammatory indices are widely used to assess systemic inflammation in diverse cardiovascular, rheumatologic, and neoplastic conditions. Yet, despite growing evidence of subclinical inflammation and immune dysregulation in lipedema, no studies have systematically evaluated whether routine hematological parameters and platelet indices reflect these processes in vivo. (Karagoz *et al.* 2014; May *et al.* 2019; Sergeeva *et al.* 2022; Tecer *et al.* 2016; Uslu & Yılmaz, 2025; Wu *et al.* 2023; Yalcinkaya *et al.* 2022; Zheng *et al.* 2025). We therefore hypothesized that women with lipedema might exhibit a distinct systemic hematological profile, with altered platelet indices such as PDW and MPV serving as accessible surrogate markers of microvascular inflammation (Allen *et al.* 2020; Felmerer *et al.* 2020a; Felmerer *et al.* 2020b; Wolf *et al.* 2021). The fact that obesity is a common comorbidity in lipedema further complicates the interpretation of these markers, as it is itself associated with chronic low-grade inflammation (Türkkan *et al.* 2022; Wu *et al.* 2023). A more comprehensive understanding of hematological and inflammatory profiles in lipedema could facilitate earlier diagnosis, improve differentiation from lymphedema and obesity, and inform the development of targeted therapies.

We aimed to compare a comprehensive panel of CBC parameters and composite inflammatory indices between women with clinically confirmed lipedema and age-matched healthy controls to determine whether lipedema is associated with a distinct systemic hematological profile.

MATERIALS AND METHODS

Study design, setting and participants

This retrospective observational study was conducted between March 2025 and May 2025 at the Physical Medicine and Rehabilitation Department of Istanbul Aydın University Hospital, Turkey. The patient group consisted of female patients aged 18 to 80 years who were clinically diagnosed with lipedema by a specialist in physical medicine and rehabilitation according to the 2020 European Lipedema Consensus (Herbst *et al.* 2021). The consensus defines lipedema as disproportionate subcutaneous adipose tissue accumulation in both limbs, typically sparing the hands and feet, that is resistant to conventional weight-loss measures irrespective of orthostatic edema. The criteria require differential diagnosis from generalized obesity and lipohypertrophy and objective characterization of soft-tissue pain using validated instruments such as a visual analogue scale, pain questionnaires, and the Central Sensitization Inventory. Obesity must also be recognized in the differential diagnosis, as patients with obesity more commonly present with generalized fat accumulation, while easy bruising and tenderness to palpation are not typical and adipose tissue generally improves with diet and weight loss (Peled *et al.* 2016). A control group was formed from healthy, age-matched women selected by simple random sampling from applicants to the hospital check-up program, provided that they had undergone all relevant laboratory analyses.

Tab. 1. Demographic and anthropometric characteristics of women with lipedema and healthy controls

	Groups		*p*
	Patients (n = 45)	**Controls (n = 40)**	
Age, years	44.53 ± 13.63	43.97 ± 12.59	0.846†
Height, cm	164.50 ± 6.20	164.00 ± 6.69	0.741†
Weight, kg	83.85 ± 13.63	67.48 ± 8.36	**< 0.001†**
Body mass index, kg/m^2	30.97 ± 4.75	25.19 ± 3.58	**< 0.001†**

Values are presented as mean ± standard deviation.
BMI, body mass index. *p* values refer to comparisons between lipedema and control groups (independent samples t test).

Tab. 2. Complete blood count parameters in women with lipedema and healthy controls

	Patients (n = 45)	Controls (n = 40)	*p*	FDR (BH) corrected *p*
WBC	6.61±1.63	6.59±1.79	0.969*	0.969
RBC	4.45±0.3	4.44±0.47	0.685	0.770
HGB	12.8±0.85	12.51±1.01	0.152*	0.354
HCT	39.01±2.26	37.93±2.99	0.068*	0.354
MCV	87.71±4.75	85.9±5.98	0.143	0.354
RDW	13.54±0.97	13.63±1.45	0.711	0.770
NEUTROPHIL	3.96±1.43	3.82±1.44	0.695	0.770
LYMPHOCYTE	2.11±0.5	2.01±0.67	0.446*	0.770
EO	0.19±0.16	0.2±0.3	0.116	0.354
MONOCYTE	0.52±0.17	0.51±0.19	0.715	0.770
BASOPHIL	0.04±0.02	0.06±0.08	0.131	0.354
PLT	270.91±67.16	278.9±62.19	0.571*	0.770
MPV	10.51±1.15	10.03±1.44	0.226	0.452
PDW	13.74±2.45	12.26±2.45	0.009	0.126

Values are mean ± standard deviation.
WBC, white blood cell count; RBC, red blood cell count; HGB, hemoglobin; HCT, hematocrit; MCV, mean corpuscular volume; RDW, red cell distribution width; PLT, platelet count; MPV, mean platelet volume; PDW, platelet distribution width; EOSINOPHIL, eosinophil count;; MONOCYTE, monocyte count; BASOPHIL, basophil count.
p values indicate between group comparisons (independent samples t test or Mann–Whitney U test, as appropriate). FDR, Benjamini–Hochberg false discovery rate–adjusted p value.
EOSINOPHIL, eosinophil count; MONOCYTE, monocyte count; BASOPHIL, basophil count

Exclusion criteria for both groups included: autoimmune diseases such as rheumatoid arthritis, Sjögren's syndrome, systemic lupus erythematosus, ankylosing spondylitis, inflammatory bowel disease, and psoriasis; acute or chronic infections; malignancies; end-stage renal disease; liver diseases such as hepatitis and liver cirrhosis; hematologic disorders or recent blood transfusion (within the last 4 months); history of bariatric surgery; acute myocardial infarction; hypertension; diabetes mellitus; cerebrovascular disease; current use of medications known to affect platelet functions or body weight; pregnancy or being within 6 months postpartum; and active smoking.

Ethics

The study protocol was reviewed and approved by the Ethics Committee of Istanbul Medipol University (Approval No: E-10840098-202.3.02-2285, Date: 26.3.2025). All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from all participants.

Data collection

Participants' demographic and anthropometric data, laboratory results and clinical data were collected retrospectively from the hospital's electronic medical record system. Anthropometric data included age, height (cm), weight (kg), and body mass index (BMI; kg/m^2), which was calculated by dividing weight in kilograms by the square of height in meters.

CBC results routinely obtained at the time of diagnostic evaluation for the lipedema group and for check up in the control group were extracted and recorded. CBC samples were analyzed within 45 minutes according to laboratory standards. Standard tubes containing a fixed amount of K3-ethylenediaminetetraacetic acid (EDTA) were used for CBC analyses. All measurements were performed using XT2000-i Sysmex (Sysmex Corporation, Kobe, Japan) automated cell counters. Laboratory parameters included red blood cell count (RBC), hemoglobin (HGB), hematocrit (HCT), mean corpuscular volume (MCV), red cell distribution width (RDW), white blood cell count (WBC), absolute neutrophil count, absolute lymphocyte count, absolute eosinophil count, absolute monocyte count, absolute basophil count, platelet count, mean platelet volume (MPV), and platelet distribution width (PDW).

Statistical analysis

For the sample calculation conducted with the G Power 3.1.9.7 program (Franz Faul, Germany), an effect size of d = 0.745 was assumed. The calculated effect size, with 95% power and a 5% margin of error, required a minimum sample size of 80, including 40 patients and 40 controls (Tecer *et al.* 2016).

SPSS version 27.0 was used to analyze the data. Histograms and the Kolmogorov-Smirnov test were

Tab. 3. Diagnostic performance of PDW for discriminating lipedema from healthy controls

	AUC (%95CI)	Cut-off	*p*	Sensitivity %	Specificity%	PPV%	NPV%	PLR	NLR
PDW	0.619 (0.247-0.991)	>12.65	0.459	66.7	75.0	75.0	67.0	2.67	0.44

Area under the receiver operating characteristic (ROC) curve (AUC) with 95% confidence interval (CI) is shown for PDW.
PPV, positive predictive value; NPV, negative predictive value; PLR, positive likelihood ratio; NLR, negative likelihood ratio.

used to examine the normal distribution of variables. Mean, standard deviation, median, and minimum-maximum values were used in descriptive analyses. Non-normally distributed variables were compared between groups using the Mann-Whitney U test, whereas normally distributed variables were compared using the independent-samples t-test. Associations between continuous variables were assessed using Spearman correlation coefficients. p values below 0.05 were considered statistically significant. Given the exploratory nature of this study and the limited sample size, we did not perform multivariable models adjusting for potential confounders such as BMI. We recognize that BMI and body weight differ between groups and may influence platelet indices, and we therefore explicitly address residual confounding by adiposity as a key limitation in the Discussion

RESULTS

The study included 45 women with lipedema and 40 healthy controls. The mean ages of the lipedema and control groups were 44.53 ± 13.63 and 43.97 ± 12.59 years, respectively, with no statistically significant difference between groups (p = 0.846). Height was also similar between groups (p = 0.741). In contrast, the lipedema group had significantly higher weight (p < 0.001) and BMI (p < 0.001) than the control group (Table 1).

Hematological parameters showed no significant between-group differences in RBC count, HGB, HCT, MCV, RDW, WBC count, absolute neutrophil count, absolute lymphocyte count, absolute eosinophil count, absolute monocyte count, absolute basophil count, platelet count, or MPV. In unadjusted analyses, PDW values were higher in the lipedema group than in controls (13.74 ± 2.45 vs 12.26 ± 2.45; p = 0.009), but this difference did not remain statistically significant after Benjamini-Hochberg correction for multiple comparisons (FDR-adjusted p > 0.05; Table 2).

In exploratory ROC analysis, PDW showed poor and statistically non-significant discriminative ability for distinguishing lipedema from controls (AUC 0.619, 95% CI 0.247-0.991; p = 0.459), and specific cut-off values were therefore not emphasized (Table 3, Figure 1).

Although Spearman correlation analyses performed on all patients revealed significant relationships between age and RDW (r = 0.247, p = 0.023) and age and MPV (r = −0.240, p = 0.027), these relationships did not maintain statistical significance after multiple testing correction (Benjamini–Hochberg FDR) (all FDR-adj p > 0.05) (Table 4).

Although negative significant correlations were observed between BMI and HGB, HCT and MCV in the case group (p < 0.05), these relationships did not maintain the level of statistical significance after applying multiple testing correction (Benjamini–Hochberg FDR) (all FDR-adj p > 0.05). (Table 5)

When the relationships between age, BMI, and hematological parameters were examined in the control group, some variables were observed to be close to significance in the raw analyses (e.g., RDW–age, EO–BMI). However, after multiple testing correction (Benjamini–Hochberg FDR), all correlations lost statistical significance (all FDR-adj p > 0.05).(Table 6)

Correlation analysis between hematological parameters was performed using multiple tests and a multiple comparison correction (Benjamini–Hochberg FDR). After correction, only the expected strong associations (WBC–Neutrophil, WBC–Lymphocyte, RBC–HGB,

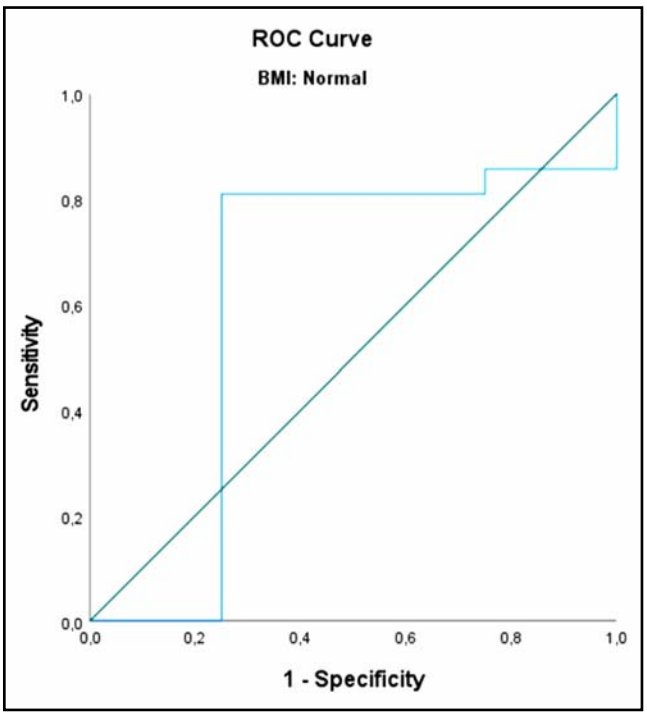

Fig. 1. Receiver operating characteristic curve of PDW for discriminating lipedema from healthy controls
ROC curve illustrating the ability of platelet distribution width (PDW) to distinguish women with lipedema (n = 45) from healthy controls (n = 40). The area under the curve (AUC) and 95% confidence interval are displayed.

Tab. 4. Correlations between age, body mass index and hematological parameters in all participants

All the participants (n = 85)		Age	BMI
WBC	r	-0.080	0.184
	p	0.470	0.122
RBC	r	0.049	0.133
	p	0.656	0.258
HGB	r	0.113	0.020
	p	0.303	0.867
HCT	r	0.112	0.000
	p	0.306	0.999
MCV	r	0.094	-0.099
	p	0.393	0.400
RDW	r	0.247	0.145
	p	**0.023**	0.216
NEUTROPHYL	r	-0.109	0.138
	p	0.323	0.239
LYMPHOCYTE	r	-0.009	0.189
	p	0.932	0.106
EO	r	-0.127	-0.077
	p	0.245	0.516
MONO	r	-0.202	0.029
	p	0.064	0.804
BASOPHIL	r	0.068	-0.135
	p	0.537	0.250
PLT	r	-0.054	0.036
	p	0.620	0.758
MPV	r	-0.240	0.002
	p	**0.027**	0.984
PDW	r	-0.068	0.028
	p	0.536	0.814

Spearman correlation coefficients (r) and corresponding *p* values are presented for relationships between age, BMI, and hematological variables in the combined cohort (n = 85).
Abbreviations as in Table 2.

Tab. 5. Correlations between age, body mass index and hematological parameters in women with lipedema

Patients (n = 45)		Age	BMI
WBC	r	-0.004	0.324
	p	0.980	0.062
RBC	r	-0.088	0.051
	p	0.564	0.775
HGB	r	-0.013	-0.405
	p	0.934	**0.017**
HCT	r	0.011	-0.404
	p	0.943	**0.018**
MCV	r	0.187	-0.397
	p	0.218	**0.020**
RDW	r	0.239	0.203
	p	0.113	0.250
NEUTROPHIL	r	-0.103	0.132
	p	0.501	0.458
LYMPHOCYTE	r	0.022	0.224
	p	0.886	0.203
EO	r	-0.066	-0.142
	p	0.667	0.422
MONO	r	-0.091	0.180
	p	0.551	0.308
BASO	r	0.215	-0.228
	p	0.156	0.195
PLT	r	-0.008	0.304
	p	0.957	0.081
MPV	r	-0.209	-0.147
	p	0.168	0.408
PDW	r	-0.046	-0.178
	p	0.764	0.315

Spearman correlation coefficients (r) and *p* values are shown for associations between age, BMI, and hematological indices in the lipedema group (n = 45).
Abbreviations as in Table 2.

RBC–HCT, RBC–MCV, and HGB–RDW) remained significant (all FDR-adj $p < 0.05$). The other associations were not significant after multiple testing correction (all FDR-adj $p > 0.05$) (Table 7)

DISCUSSION

Although several distinct morphological features of lipedema have been identified, the mechanisms driving these alterations remain largely unexplored (Poojari *et al.* 2022). Platelet activation triggers the release of PF4 during inflammatory and wound healing responses. Recent observations of increased PF4 concentrations in lipedema patients, a pattern also found in lymphedema, provide further support for the hypothesis that lymphatic dysfunction underlies pathological adipose tissue expansion (Ma *et al.* 2020). The adipose tissue of individuals with lipedema undergoes significant structural and functional changes, including heightened basal lipolysis (Sergeeva *et al.* 2022), chronic inflammation, and abnormal fluid retention (Felmerer *et al.* 2020a; Ibarra *et al.* 2018; Ishaq *et al.* 2022). Emerging evidence also suggests that inflammation may contribute to lipedema-related pain, supported by observed changes in tissue sensitivity. The clinical

Tab. 6. Correlations between age, body mass index and hematological parameters in healthy controls

Controls (n = 40)		Age	BMI
WBC	r	-0.149	0.168
	p	0.371	0.314
RBC	r	0.179	0.234
	p	0.270	0.147
HGB	r	0.212	0.191
	p	0.189	0.239
HCT	r	0.164	0.180
	p	0.312	0.265
MCV	r	0.014	-0.015
	p	0.933	0.926
RDW	r	0.274	0.062
	p	0.087	0.702
NEUTROPHIL	r	-0.099	0.188
	p	0.545	0.244
LENFOSİT	r	-0.073	0.031
	p	0.654	0.852
EO	r	-0.188	-0.259
	p	0.245	0.106
MONO	r	-0.256	-0.150
	p	0.110	0.356
BASOFİL	r	-0.090	-0.054
	p	0.579	0.739
PLT	r	-0.100	-0.042
	p	0.540	0.798
MPV	r	-0.269	-0.097
	p	0.093	0.550
PDW	r	-0.147	-0.172
	p	0.366	0.289

Spearman correlation coefficients (r) and *p* values are shown for associations between age, BMI, and hematological indices in the control group (n = 40).
Abbreviations as in Table 2.

benefits of compression therapy and volume reduction in terms of pain relief (Fink *et al.* 2021; Herbst *et al.* 2021; Paling & Macintyre, 2020) further support the hypothesis of inflammatory involvement in symptoms. These findings indicate that lipedema involves not only adipose tissue abnormalities but also inflammatory mechanisms (Chakraborty *et al.* 2022).

Studies examining inflammation in lipedema have primarily focused on affected tissue. One of the most important candidate biomarkers is platelet factor 4 (PF4), a plasma-circulating exosomal protein proposed as a marker of lymphatic dysfunction and a potential discriminator between lymphatic disorders and obesity. PF4 levels are increased in patients with lipedema and do not appear to be explained by obesity alone (Ma *et al.* 2020). In this study, we compared hematologic inflammatory markers and indices between women with clinically-confirmed lipedema and age-matched healthy controls in order to investigate if systemic platelet originated markers have predictive value in lipedema.

MPV and PDW have increasingly been recognized as meaningful biomarkers in clinical practice, with studies linking it to inflammation, vascular and neurological disorders, and cancer-related processes (Bekler *et al.* 2015; Cadoni *et al.* 2024; Li *et al.* 2017). Larger platelets are hypothesized to have increased hemostatic potential. In a large meta-analysis of patients with coronary artery disease, a high MPV was associated with worse outcomes, and in another study MPV has also been found to be higher in patients with type 2 diabetes and thought to be in relation with microvascular complications (Sansanaydhu *et al.* 2015, Papanas *et al.* 2004).

In the field of cardiology, elevated PDW levels have been shown to predict worse outcomes in acute coronary syndromes, likely reflecting underlying platelet activation and endothelial dysfunction (Bekler *et al.* 2015). A similar trend is seen in rheumatology, where PDW correlates with disease activity in rheumatoid arthritis and tends to decline with effective anti-inflammatory treatment (Khaled *et al.* 2020).

Our results showed that MPV and PDW were numerically higher in women with lipedema than in healthy controls; however, these differences did not remain statistically significant after correction for multiple comparisons. In light of PF4 as an emerging biomarker in lipedema, platelet-based hematological parameters remain of interest for future research, but our findings do not support their current use as diagnostic markers (Ma *et al.* 2020). Because PDW and MPV are routinely reported in complete blood counts, they represent attractive, low cost candidates for biomarker development in lipedema (Bekler *et al.* 2015; Cadoni *et al.* 2024). In our cohort, however, the modest numerical elevations in PDW and MPV did not remain statistically significant after correction for multiple comparisons, and ROC analysis showed no meaningful discriminative ability. These findings argue against the use of PDW or MPV as standalone diagnostic markers and suggest that systemic platelet indices, at least in isolation, may be insufficient to capture the predominantly tissue localized microvascular inflammation described in lipedema.. Future studies should therefore prioritize larger, BMI matched cohorts, integrate platelet indices with tissue based or imaging biomarkers, and evaluate whether composite scores offer greater diagnostic specificity than individual CBC derived parameters.

Several studies have explored the role of inflammation in lipedema, and we summarize some of the key findings below. However, to our knowledge, no published studies have yet specifically investigated or reported an association between PDW and lipedema.

Tab. 7. Correlations among hematological parameters in all participants

		RBC	HGB	HCT	MCV	RDW	NEUTROPHYL	LYMPHOCYTE	EO	MONO	BASOPHYL	PLT	MPV	PDW
WBC	r	0.063	-0.236	-0.193	-0.213	0.144	0.719	0.536	0.141	0.435	0.230	0.151	0.119	-0.252
	p	0.683	0.119	0.204	0.161	0.346	**<0.001**	**<0.001**	0.357	**0.003**	0.129	0.324	0.438	0.095
RBC	r		0.584	0.520	-0.599	-0.095	0.058	0.102	-0.094	0.235	-0.051	0.072	-0.139	-0.135
	p		**<0.001**	**<0.001**	**<0.001**	0.536	0.707	0.506	0.540	0.120	0.739	0.640	0.361	0.378
HGB	r			0.755	0.074	-0.500	-0.207	-0.094	-0.229	-0.101	0.091	-0.115	-0.090	-0.126
	p			**<0.001**	0.628	**<0.001**	0.173	0.540	0.131	0.509	0.551	0.452	0.558	0.409
HCT	r				0.281	-0.205	-0.095	-0.085	-0.170	-0.010	-0.013	-0.095	0.010	-0.005
	p				0.061	0.177	0.534	0.577	0.263	0.948	0.932	0.535	0.949	0.972
MCV	r					-0.123	-0.166	-0.171	-0.096	-0.287	0.091	-0.221	0.121	0.061
	p					0.422	0.275	0.261	0.530	0.056	0.550	0.144	0.427	0.688
RDW	r						0.138	-0.026	0.308	0.072	-0.004	0.105	-0.126	0.176
	p						0.367	0,863	**0.040**	0.639	0.979	0.494	0.409	0.248
NEUTROPHYL	r							0.293	0.146	0.225	0.084	-0.012	0.183	-0.143
	p							0.051	0.340	0.138	0.584	0.938	0.230	0.350
LYMPHOCYTE	r								0.255	0.214	0.171	0.337	0.160	0.088
	p								0.092	0.159	0.261	**0.024**	0.292	0.564
EO	r									0.125	0.307	0.143	-0.018	0.088
	p									0.413	**0.040**	0.350	0.907	0.567
MONO	r										0.308	0.091	0.045	-0.400
	p										**0.039**	0.552	0.770	**0.007**
BASOPHYL	r											0.117	-0.007	-0.318
	p											0.444	0.962	**0.033**
PLT	r												-0.534	-0.195
	p												**<0.001**	0.198
MPV	r													0.422
	p													**0.004**

Spearman correlation coefficients (r) and p values describe pairwise relationships between complete blood count parameters in the combined sample (n = 85).
Abbreviations as in Table 2.

Multiple independent studies describe lipedema as a disorder characterized by increased vascular permeability, stromal vascular fraction dysfunction, and chronic low grade inflammation that appears largely independent of generalized obesity. Histological and molecular analyses consistently report macrophage rich perivascular infiltrates, elevated VEGF C, altered endothelial junction proteins, and distinct cytokine signatures in lipedema adipose tissue. These robust tissue-level abnormalities contrast with the largely unremarkable systemic CBC-derived markers observed in this study and suggest that inflammation in lipedema may be compartmentalized within the microvasculature and adipose tissue. This compartmentalization may explain why conventional systemic markers, including PDW and MPV, showed only subtle, non-significant changes despite substantial local pathology (Allen *et al.* 2020; Bauer *et al.* 2019; Felmerer *et al.* 2020a; Felmerer *et al.* 2020b; Grewal *et al.* 2025; Priglinger *et al.* 2017; Strohmeier *et al.* 2022; Wolf *et al.* 20219).

In this context, MPV and PDW may reflect processes related more closely to platelet activation and microvascular dysfunction than to generalized systemic inflammation. The lack of statistical significance may be due to the modest sample size or to the limited sensitivity of these markers for detecting chronic, low-grade inflammation within microvascular and adipose compartments. These indices are more strongly influenced by acute systemic inflammation and may therefore be insufficiently altered by the tissue-level changes seen in lipedema.

Considering that platelets play a role not only in hemostasis but also in immune regulation, the observed increase in vascular permeability and perivascular inflammation in lipedema could be linked to subtle alterations in platelet function. Our findings may support the design of new diagnostic studies.

This study has several important limitations. First, the retrospective, single center design and reliance on routine clinical data introduce potential selection and information biases. Second, the lipedema group had higher BMI and body weight than controls, and we did not adjust PDW or MPV for these variables; residual confounding by adiposity therefore cannot be excluded and may have attenuated or obscured true associations. Third, the sample size was modest and powered to detect relatively large effect sizes, so smaller but potentially relevant differences in platelet indices may have been missed. Finally, we lacked detailed information on disease duration, stage, and hormonal status, which could influence both inflammatory profiles and platelet parameters.

CONCLUSION

This study examined readily accessible systemic inflammatory markers derived from complete blood count parameters in women with lipedema and healthy controls. PDW and MPV were numerically higher in the lipedema group, but these differences were not statistically significant after correction for multiple comparisons. These findings do not support the use of PDW or MPV as diagnostic markers for lipedema at present and indicate that routine CBC parameters alone are unlikely to distinguish lipedema from healthy controls or from obesity in clinical practice. Nevertheless, the findings support further investigation of platelet indices in larger, better-controlled studies to clarify their potential pathophysiological and diagnostic relevance.

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Competing interests

The authors have declared that no competing interests exist.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Institutional Review Board Statement

The study protocol was reviewed and approved by the Ethics Committee of Istanbul Medipol University (Approval No: E-10840098-202.3.02-2285, Date: 26.3.2025). All procedures were conducted in accordance with the principles outlined in the Declaration of Helsinki.

REFERENCES

1 Allen M, Schwartz M, Herbst KL (2020). Interstitial fluid in lipedema and control skin. Womens Health Rep. **1**(1): 480–487. doi:10.1089/whr.2020.0071

2 Bauer A-T, von Lukowicz D, Lossagk K, Hopfner U, Kirsch M, Moog P, et al. (2019). Adipose stem cells from lipedema and control adipose tissue respond differently to adipogenic stimulation in vitro. Plast Reconstr Surg. **144**(3): 623–632. doi:10.1097/PRS.0000000000005868

3 Bekler A, Ozkan MTA, Tenekecioglu E, Gazi E, Yener AU, Temiz A, et al. (2015). Increased platelet distribution width is associated with severity of coronary artery disease in patients with acute coronary syndrome. Angiology. **66**(7): 638–643. doi:10.1177/0003319714547897

4 Bowman C, Rockson SG (2024). The role of inflammation in lymphedema: a narrative review of pathogenesis and opportunities for therapeutic intervention. Int J Mol Sci. **25**(7): 3907. doi:10.3390/ijms25073907

5 Buck DW, Herbst KL (2016). Lipedema: a relatively common disease with extremely common misconceptions. Plast Reconstr Surg Glob Open. **4**(9): e1043. doi:10.1097/GOX.0000000000001043

6 Cadoni MPL, Coradduzza D, Congiargiu A, Sedda S, Zinellu A, Medici S, et al. (2024). Platelet dynamics in neurodegenerative disorders: investigating the role of platelets in neurological pathology. J Clin Med. **13**(7): 2102. doi:10.3390/jcm13072102

7 Carvalho R (2024). Lipedema: a common though often unrecognized condition. Chin J Plast Reconstr Surg. **6**(1): 14–23. doi:10.1016/j.cjprs.2023.11.002

8 Chakraborty A, Crescenzi R, Usman TA, Reyna AJ, Garza ME, Al-Ghadban S, et al. (2022). Indications of peripheral pain, dermal hypersensitivity, and neurogenic inflammation in patients with lipedema. Int J Mol Sci. **23**(18): 10313. doi:10.3390/ijms231810313

9 Daftuar F, Eakin GS, Galia S, Harmacek L, Kartt J, Peterson S (2023). Lipedema research roadmap. Lymphat Res Biol. **21**(4): 408–416. doi:10.1089/lrb.2023.0012

10 Eakin GS, Peterson S (2023). Lipedema: a current understanding of its pathology and natural history. Phlebology. **38**(4): 219–229. doi:10.1177/02683555231163063

11 Felmerer G, Stylianaki A, Hägerling R, Wang A, Ströbel P, Hollmén M, et al. (2020a). Adipose tissue hypertrophy, an aberrant biochemical profile and distinct gene expression in lipedema. J Surg Res. **253**: 294–303. doi:10.1016/j.jss.2020.03.004

12 Felmerer G, Stylianaki A, Hollmén M, Ströbel P, Stepniewski A, Wang A, et al. (2020b). Increased levels of VEGF-C and macrophage infiltration in lipedema patients without changes in lymphatic vascular morphology. Sci Rep. **10**(1): 10947. doi:10.1038/s41598-020-67987-3

13 Fink JM, Schreiner L, Marjanovic G, Erbacher G, Seifert GJ, Foeldi M, et al. (2021). Leg volume in patients with lipoedema following bariatric surgery. Visc Med. **37**(3): 206–211. doi:10.1159/000514787

14 Grewal T, Kempa S, Buechler C (2025). Lipedema: a disease triggered by M2 polarized macrophages? Biomedicines. **13**(3): 561. doi:10.3390/biomedicines13030561

15 Herbst KL, Kahn LA, Iker E, Crescenzi R, Ehrlich C, Faris T, et al. (2021). Letter to the editor regarding "Lipoedema – myths and facts, Part 1 and Part 5. European Best Practice of Lipoedema – Summary of the European Lipoedema Forum consensus. Phlebologie 2020; 49:31–49". Phlebologie. **50**(1): e5–e6. doi:10.1055/a-1331-3341

16 Ibarra M, Eekema A, Ussery C, Neuhardt D, Garby K, Herbst K (2018). Subcutaneous adipose tissue therapy reduces fat by dual X-ray absorptiometry scan and improves tissue structure by ultrasound in women with lipoedema and Dercum disease. Clin Obes. **8**(6): 398–406. doi:10.1111/cob.12279

17 Ishaq M, Bandara N, Morgan S, Nowell C, Mehdi AM, Lyu R, et al. (2022). Key signaling networks are dysregulated in patients with the adipose tissue disorder, lipedema. Int J Obes. **46**(3): 502–514. doi:10.1038/s41366-021-01020-7

18 Karagoz E, Ulcay A, Tanoglu A, Kara M, Turhan V, Erdem H, et al. (2014). Clinical usefulness of mean platelet volume and red blood cell distribution width to platelet ratio for predicting the severity of hepatic fibrosis in chronic hepatitis B virus patients. Eur J Gastroenterol Hepatol. **26**(12): 1320–1324. doi:10.1097/MEG.0000000000000201

19 Khaled SA, Nasreldin E, Makarem YS, Mahmoud HF (2020). Value of platelet distribution width and mean platelet volume in disease activity score of rheumatoid arthritis. J Inflamm Res. **13**: 595–606. doi:10.2147/JIR.S255597

20 Li N, Diao Z, Huang X, Niu Y, Liu T, Liu Z-P, et al. (2017). Increased platelet distribution width predicts poor prognosis in melanoma patients. Sci Rep. **7**(1): 2970. doi:10.1038/s41598-017-03107-7

21 Ma W, Gil HJ, Escobedo N, Benito-Martín A, Ximénez-Embún P, Muñoz J, et al. (2020). Platelet factor 4 is a biomarker for lymphatic-promoted disorders. JCI Insight. **5**(13): e135109. doi:10.1172/jci.insight.135109

22 May JE, Marques MB, Reddy VV, Gangaraju R (2019). Three neglected numbers in the CBC: the RDW, MPV, and NRBC count. Cleve Clin J Med. **86**(3): 167–172. doi:10.3949/ccjm.86a.18033

23 Paling I, Macintyre L (2020). Survey of lipoedema symptoms and experience with compression garments. Br J Community Nurs. **25**(Suppl 4): S17–S22. doi:10.12968/bjcn.2020.25.Sup4.S17

24 Papanas N, Symeonidis G, Maltezos E, Mavridis G, Karavageli E, Vosnakidis T, et al. (2004). Mean platelet volume in patients with type 2 diabetes mellitus. Platelets. **15**(8): 475–478. doi:10.1080/0953710042000267707

25 Poojari A, Dev K, Rabiee A (2022). Lipedema: insights into morphology, pathophysiology, and challenges. Biomedicines. **10**(12): 3081. doi:10.3390/biomedicines10123081

26 Poyrazoğlu HG, Öztürk AB (2020). Predictive value of laboratory parameters in childhood migraine. Acta Neurol Belg. **120**(4): 907–914. doi:10.1007/s13760-020-01332-7

27 Priglinger E, Wurzer C, Steffenhagen C, Maier J, Hofer V, Peterbauer A, et al. (2017). The adipose tissue-derived stromal vascular fraction cells from lipedema patients: are they different? Cytotherapy. **19**(7): 849–860. doi:10.1016/j.jcyt.2017.04.001

28 Sansanaydhu N, Numthavaj P, Muntham D, McEvoy M, Attia J, Thakkinstian A, et al. (2015). Prognostic effect of mean platelet volume in patients with coronary artery disease: a systematic review and meta-analysis. Thromb Haemost. **114**(6): 1299–1309. doi:10.1160/TH15-04-0280

29 Sergeeva NS, Karmakova TA, Polyak MA, Alentov II, Kaprin AD (2022). Systemic inflammatory response as a prognostic factor in breast cancer. Part I: tumor-promoting inflammation and serum inflammatory markers. Ann Russ Acad Med Sci. **77**(5): 345–353. doi:10.15690/vramn1578

30 Strohmeier K, Hofmann M, Jacak J, Narzt M-S, Wahlmueller M, Mairhofer M, et al. (2022). Multi-level analysis of adipose tissue reveals the relevance of perivascular subpopulations and an increased endothelial permeability in early-stage lipedema. Biomedicines. **10**(5): 1163. doi:10.3390/biomedicines10051163

31 Tecer D, Sezgin M, Kanık A, İncel NA, Çimen ÖB, Biçer A, et al. (2016). Can mean platelet volume and red blood cell distribution width show disease activity in rheumatoid arthritis? Biomark Med. **10**(9): 967–974. doi:10.2217/bmm-2016-0042

32 Türkkan E, Dağ NÇ, Arabacı Ç, Dikker O, Dağ H (2022). Evaluation of inflammatory hematological ratios (NLR, PLR, MLR and monocyte/HDL-cholesterol ratio) in obese adolescents. Iberoam J Med. **4**(1): 11–17. doi:10.53986/ibjm.2022.0007

33 Uslu MF, Yılmaz M (2025). Are inflammatory markers important for assessing the severity of diabetic polyneuropathy? Medicina (Kaunas). **61**(3): 400. doi:10.3390/medicina61030400

34 Van La Parra RF, Deconinck C, Pirson G, Servaes M, Fosseprez P (2023). Lipedema: what we don't know. J Plast Reconstr Aesthet Surg. **84**(3): 302–312. doi:10.1016/j.bjps.2022.10.015

35 Wolf S, Deuel JW, Hollmén M, Felmerer G, Kim B-S, Vasella M, et al. (2021). A distinct cytokine profile and stromal vascular fraction metabolic status without significant changes in the lipid composition characterizes lipedema. Int J Mol Sci. **22**(7): 3313. doi:10.3390/ijms22073313

36 Wu C-C, Wu C-H, Lee C-H, Cheng C-I (2023). Association between neutrophil percentage-to-albumin ratio, neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio and long-term mortality in community-dwelling adults with heart failure: evidence from US NHANES 2005–2016. BMC Cardiovasc Disord. **23**(1): 312. doi:10.1186/s12872-023-03236-2

37 Yalcinkaya A, Yalcinkaya R, Sardh F, Landegren N (2025). Immune dynamics throughout life in relation to sex hormones and perspectives gained from gender-affirming hormone therapy. Front Immunol. **15**: 1501364. doi:10.3389/fimmu.2024.1501364

38 Yalcinkaya R, Öz FN, Durmuş SY, Fettah A, Kaman A, Teke TA, et al. (2022). Is there a role for laboratory parameters in predicting coronary artery involvement in Kawasaki disease? Klin Padiatr. **234**(6): 382–387. doi:10.1055/a-1816-6754

39 Zheng Y, Guo Z, Wang J, Wu Z, Chen X, Zhu Y, et al. (2025). Exploring and validating associations between six systemic inflammatory indices and ischemic stroke in a middle-aged and older Chinese population. Aging Clin Exp Res. **37**(1): 1–10. doi:10.1007/s40520-024-02626-z