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ORIGINAL RESEARCH

Platelet Parameters, C-Reactive Protein, and Depression: An Association Study

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Objective: This study aims to investigate the correlation of platelet parameters and C-reactive protein (CRP) with depression.

Methods: The clinical data of 61 patients with depression and 30 healthy control subjects were collected to compare the platelet parameters, CRP levels, and Hamilton Depression Rating Scale (HAMD) scores of the two groups for correlation analysis.

Results: The results revealed that the body mass index (BMI) of patients with depression was lower ($P < 0.05$) than that of the healthy control subjects, and that this difference was more significant in women than in men. Patients with severe depression showed an increased mean platelet volume (MPV) ($P < 0.05$). In the patients with depression, MPV was positively correlated ($P < 0.05$) with HAMD scores for work and interest, gastrointestinal symptoms, hopelessness, the anxiety/somatization factor, and the hopelessness factor. Platelet count (PLT) was negatively correlated ($P < 0.05$) with HAMD scores for hypochondriasis, and plateletcrit (PCT) was negatively correlated ($P < 0.05$) with HAMD scores for middle insomnia and hypochondriasis. Platelet distribution width (PDW) was positively correlated ($P < 0.05$) with HAMD scores for gastrointestinal and systemic symptoms as well as hopelessness. Higher CRP levels ($P < 0.05$) were found in the patients with depression than in the healthy control subjects. Furthermore, in the patients with depression, CRP levels were positively correlated ($P < 0.05$) with HAMD scores for guilt and the cognitive impairment factor.

Conclusion: Classical platelet parameters (PLT, MPV, PCT, PDW) and CRP were shown to be associated with specific depressive symptoms and cognitive impairment factors, including sleep, gastrointestinal symptoms, hypochondriasis, losing interest in work, and despair. These results suggest that both platelet parameters and CRP could be suitable biomarkers for predicting the occurrence and prognosis of depression, thus providing a new target for its treatment.

Keywords: depression, platelet parameters, C-reactive protein, Hamilton Depression Rating Scale

Introduction

Depression is a common mental disorder. Its core symptoms include persistent black moods, loss of interest in activities of daily living, and persistent fatigue. It was predicted that, by 2020, depression would become the second most prevalent type of disease worldwide, after cardiovascular and cerebrovascular diseases.[1] Inflammation is likely a critical disease modifier, promoting susceptibility to depression. Controlling inflammation might provide an overall therapeutic benefit, regardless of whether it is secondary to early life trauma, a more acute stress response, microbiome alterations, genetic diathesis, or a combination of these and

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other factors.[2] A large retrospective study found that students who reported depression showed an increased likelihood of exhibiting ear infections, bronchitis, sinus infections, and strep throat.[3] There is also evidence that various bacterial and viral infections are associated with a range of depressive symptoms.[4]

Platelets are increasingly considered a bridge between mental, immunological, and coagulation-related disorders. The standard parameters associated with platelets include platelet count (PLT), mean platelet volume (MPV), plateletcrit (PCT), and platelet distribution width (PDW). These parameters also reflect platelet generation, which has a relationship with depression. Studies have shown that MPV is increased in patients with depression as a result of increased sympathetic nerve cortisol secretion and higher catecholamine levels, as well as adrenaline activation of adrenal receptors.[5] Research in a Chinese population revealed that both MPV and PLT levels decreased in 31 female inpatients after antidepressant treatment.[6] Both clinical and experimental studies have proposed that traditional drugs for inhibiting platelet aggregation, such as aspirin, can enhance the treatment effects of antidepressant medications when used in combination, and can also have an antidepressant treatment effect when used alone.[7,8]

Researchers have also investigated the relationship between major depressive disorder (MDD) and platelets by testing the platelet parameters. A study in an adult Turkish population sample revealed a significant independent association between MDD and MPV levels, with MPV being significantly higher in individuals with MDD.[9] Studies have also reported significantly decreased MPV and PDW levels in patients with mild cognitive impairment and Alzheimer's disease (AD) compared with control subjects, reducing further as cognitive level declined,[10,11] while other research has found reduced levels of PDW but increased levels of MPV in AD patients.[12] The parameter of PDW, an index expressing heterogeneity of platelet size, has been shown to be negatively associated with psychological resilience and positively correlated with depressive symptoms.[13] As such, PDW might be a useful marker of platelet function in developing a new potential biomarker of depression and conditions in the neuropsychiatric domain.[14]

C-reactive protein (CRP) is an acute-phase protein, and it is the most commonly used marker of systemic inflammation in humans. It is mainly synthesized and degraded by the liver, responding to the inflammatory state of the body. It is probable that the release of CRP and inflammatory cytokines leads to norepinephrine and 5-HT system dysfunction, thus causing depressive symptoms.[15] Miler et al[16] showed that CRP in the plasma was increased in patients with depression,[17] and a meta-analysis study also found higher levels of CRP in the blood in patients with MDD than in a normal control population.[18] These studies both demonstrated abnormally elevated CRP levels in patients with depression. In addition, CRP is associated with higher suicidality in patients with mental disorders, further supporting that there is a close correlation between depression and CRP.[2]

However, the correlations of PLT parameters and CRP with depression remain unclear due to the associations between CRP levels, platelet parameters, and specific depressive symptoms being relatively poorly studied. Therefore, the present study aims to investigate further the correlations of PLT parameters and CRP with depression to provide valuable clues for the clinical diagnosis and treatment of depression.

Materials and Methods

Object of the Study

In the present study, patients with depression who were treated in our hospital between March 2017 and February 2019 were included in the depression group, while healthy subjects who participated in a physical examination were included in the control group. Diagnosis of depression for this research was performed in accordance with the diagnostic criteria in the International Classification of Diseases, 10th Revision, requiring at least two items of typical symptoms and other symptoms. The diagnosis for more severe forms of depression requires that the symptoms should last for two weeks or more. The typical depressive symptoms include (1) a black mood, (2) loss of interest and pleasure, and (3) fatigue. Other symptoms include (1) a decrease in the ability to focus, (2) a decrease in self-evaluation and self-confidence, (3) a feeling of self-guilt and lack of a sense of value (also observed in mild depression), (4) a dim and pessimistic understanding of the future, (5) thoughts or behaviors of self-injury or suicide, (6) sleep disorder, and (7) alteration of appetite.[2]

The present study was performed in accordance with the Helsinki Declaration of the World Medical Association and was approved by the Ethics Committee of The Second People's Hospital Affiliated to Fujian University of

Traditional Chinese Medicine. All participants provided signed informed consent.

Inclusion and Exclusion Criteria

The inclusion criteria for the depression group were as follows: (1) the patient's place of residence was located in Fujian province; (2) the patient was 18–60 years old; (3) the patient met the above criteria for the Western medicine diagnosis of depression; (4) the patient was aware and accepted undertaking the Hamilton Depression Rating Scale (HAMD) scale survey and assessment; (5) the patient's symptoms recurred after stopping drugs for more than two months or without any antidepressive treatment; and (6) the patient voluntarily participated in the clinical trial and provided signed informed consent.

The inclusion criteria for the control group were as follows: (1) the subject's place of residence was located in Fujian province; (2) the subject was 18–60 years old; (3) the subject was able to communicate normally and had no severe language or hearing impairment; (4) the subject had a HAMD score of <8 out of 24 items; and (4) the subject did not have any mental disorder such as mania or dissociative identity disorder.

The exclusion criteria were as follows: (1) patients >60 or <18 years old; (2) women who were pregnant or lactating; (3) patients who were addicted to or reliant on alcohol or drugs; (4) patients with severe heart, brain, or kidney diseases; (5) patients with awareness disorders, aphasia or agnosia, preventing them from communicating; (6) patients suffering from hyperthyroidism, autoimmune diseases, or cancer; (7) patients with a history of hypertension, hyperlipidemia, myocardial infarction, coronary atherosclerotic heart disease, or cerebral infarction; (8) patients suffering from hematological diseases; (9) patients with infectious diseases, eg, abscesses, pneumonia, or chronic obstructive pulmonary disease; (10) patients who had received hormonal drugs or contraceptives within the previous six months; and (11) patients who had received drugs for inhibiting platelet aggregation or anti-inflammatory drugs within the previous three months.

Participant Loss and Removal Criteria

The data of subjects who refused to undertake the relevant examinations and tests were excluded from the study.

Research Method

Before enrollment in the study and taking the relevant medicine, each patient underwent a HAMD assessment (scores: <8 = no depression; 8–20 = mild depression; 21–35 = moderate depression; >35 = severe depression) on the day before blood sample collection, performed by a full-time staff member. The general data for the included subjects and their results for the above scale were recorded in the case file. On the following day, elbow vein blood was collected under fasting status. Then, EDTA-K2 anticoagulant was added, and the sample was fully shaken. Within two hours of sample collection, routine blood tests were performed using the resistivity and fluorescence methods, a SYSMEX XN-3000 blood cell analyzer, and the supporting diluent. For CRP testing, the whole blood sample was measured by latex-enhanced immunoturbidimetry (BC5390, Mindray, China), and the coefficient of variation of the CRP measurements was <8.3%.

Statistical Method

All data were expressed as mean ± SD or median (P25, P75). One-way analysis of variance was used to compare the differences in MPV levels between the different groups. The Mann–Whitney *U*-test was used to compare the differences between PLT, PCT, PDW, and CRP levels of the different groups. Spearman correlation analysis was used to analyze the correlations of HAMD items with platelet parameters and CRP levels. All statistical analysis was performed using SPSS v20.0, and a P value of <0.05 was considered statistically significant.

Results

Comparison of Demographic Characteristics Between Two Groups

There were 19 male and 42 female patients in the depression group. The mean age of these patients was 41.98 ± 10.78 years, and the mean body mass index (BMI) was 21.25 ± 3.18. There were six male and 24 female patients in the control group. The mean age of these patients was 37.10 ± 12.86 years, and the mean BMI was 23.01 ± 3.68. The analysis results revealed that there was no statistically significant difference in gender or age ($P > 0.05$); however, BMI was significantly lower in the depression group than in the control group ($P < 0.05$; Table 1).

Comparison of Platelet Parameters in Patients with Different Levels of Depression

The 61 patients with depression were divided into three groups according to their HAMD scores: a mild depression group, a moderate depression group, and a severe depression

Table 1 Comparison of Demographic Characteristics Between the Two Groups

	Depressed (n=61)	Controls (n=30)	P value
Gender			
Male	19 (31.1%)	6 (20.0%)	0.263
Female	42 (68.9%)	24 (80.0%)	
Age (Y)	44 (32.5,49.5)	28 (26,50)	0.075
BMI (kg/m^2)	21.3 (19.1,22.8)	22.7 (19.8,25.2)	0.043*
Employed	25 (41.0%)	7 (24.1%)	0.119
Unemployed	36 (59.0%)	22 (75.9%)	
Smoking			
Current smokers	2 (3.3%)	1 (3.4%)	0.967
Never smoking	59 (96.7%)	28 (96.6%)	
Drinking			
Current drinking	6 (9.8%)	0 (0.0%)	0.195
Never drinking	55 (90.2%)	29 (100.0%)	
Course of disease (month)			
<6	30 (49.2%)	0	----
6–12	10 (16.4%)	0	
>12	21 (34.4%)	0	

Note: *P<0.05.
Abbreviation: BMI, body mass index.

group. The statistical results revealed statistically significant differences in MPV between the four groups (P < 0.05; Table 2; Supplementary Figure 1). However, there were no statistically significant differences between the PLT, PCT, or PDW values of the four groups (P > 0.05; Table 2).

Correlation Analysis Between Platelet Parameters and HAMD Scores in the Depression Group

In the depression group, PLT was negatively correlated with the HAMD score for hypochondriasis, with a correlation coefficient of −0.290 (P < 0.05; Table 3), and PCT was negatively correlated with the HAMD scores for light sleep and hypochondriasis, with correlation coefficients of −0.276 and −0.279, respectively (P < 0.05; Table 3). Meanwhile, PDW was positively correlated with the HAMD scores for gastrointestinal symptoms, constitutional symptoms, and hopelessness, with correlation coefficients of 0.255, 0.272, and 0.240, respectively (P < 0.05; Table 3), and negatively correlated with the HAMD score for hypochondriasis, with a correlation coefficient of −0.240 (P < 0.01; Table 3). In this group, MPV was positively correlated with the HAMD scores for work and interest, gastrointestinal symptoms, and hopelessness, with correlation coefficients of 0.275, 0.251, and 0.378, respectively (P < 0.05). Furthermore, MPV was positively correlated with the HAMD scores for the anxiety/somatization and hopelessness factors, with correlation coefficients of 0.259 and 0.321, respectively (P < 0.05; Table 4).

Comparison of C-Reactive Protein Between the Two Groups

The CRP level of the patients in the depression group was 2.50 (2.50, 3.74) mg/L, while that of the control group was 2.50 (2.50, 2.50) mg/L. These results show that the CRP level of the patients in the depression group was higher than that in the control group, and the difference was statistically significant (Z = −3.495, P < 0.05; Table 5; Supplementary Figure 2).

Correlation Analysis Between C-Reactive Protein and HAMD Scores in the Depression Group

The CRP level of the patients with depression was positively correlated with the HAMD score for guilt, and the correlation coefficient was 0.340, P = 0.007 (P < 0.01; Table 6). Furthermore, there was a positive correlation between CRP and the HAMD factor scores for cognitive

Table 2 Comparison of Platelet Parameters in Patients with Different Levels of Depression

	n	PLT (×10^9/L)	MPV (fL)	PCT (%)	PDW (%)
Non-depression group	30	245.00 (224.50, 283.50)	9.83±0.93	0.23 (0.22, 0.27)	11.05 (9.88, 13.73)
Mild depression group	20	239.00 (191.50, 308.25)	9.77±1.20	0.25 (0.19, 0.28)	11.80 (9.63, 13.60)
Moderate depression group	28	252.50 (217.50, 273.00)	9.83±0.73	0.24 (0.21, 0.29)	10.76 (9.93, 11.78)
Severe depression group	13	210.00 (184.50, 269.00)	10.15±0.91	0.23 (0.22, 0.28)	12.30 (10.90, 14.10)
P	----	0.235	0.023*	0.980	0.142

Note: *P<0.05.
Abbreviations: PLT, platelet; MPV, mean platelet volume; PCT, plateletcrit; PDW, platelet distribution width.

Table 3 The Correlation Analysis Between Platelet Parameters and HAMD Factor Score in the Depression Group

HAMD	MPV		PLT		PCT		PDW	
	r	P	r	P	r	P	r	P
Depressed mood	0.041	0.751	0.051	0.632	0.197	0.128	0.082	0.528
Guilty	0.007	0.958	−0.036	0.735	0.004	0.979	0.037	0.779
Suicide	0.140	0.283	0.089	0.401	0.153	0.239	0.106	0.418
Difficulty falling asleep	0.059	0.651	0.207	0.109	−0.277	0.162	−0.021	0.870
Light sleep	0.037	0.779	−0.199	0.059	−0.276	0.031*	−0.078	0.550
Early awakening	0.048	0.714	−0.031	0.765	0.079	0.543	0.060	0.649
Work and interest	0.275	0.032*	−0.030	0.775	0.089	0.497	0.087	0.507
Sluggish	0.050	0.702	−0.072	0.496	−0.062	0.636	0.081	0.533
Agitation	0.138	0.288	−0.031	0.902	0.167	0.199	0.030	0.827
Psychic anxiety	0.152	0.241	−0.069	0.513	0.040	0.760	0.042	0.748
Somatic anxiety	0.230	0.074	−0.051	0.630	0.098	0.451	0.075	0.566
Gastrointestinal symptoms	0.367	0.004#	0.025	0.817	0.242	0.060	0.255	0.047*
Constitutional symptoms	0.251	0.051	−0.023	0.827	0.197	0.128	0.272	0.034*
Sexual symptoms	0.163	0.208	−0.137	0.294	−0.015	0.911	0.045	0.728
Hypochondriasis	0.065	0.617	−0.290	0.024*	−0.279	0.030*	−0.082	0.547
Loss of weight	0.221	0.055	−0.148	0.255	−0.009	0.945	0.163	0.210
Self-conciousness	0.050	0.703	−0.007	0.955	0.065	0.621	−0.027	0.839
Change (day and night)	−0.176	0.175	−0.074	0.570	−0.187	0.149	−0.181	0.163
Disintegration of personality or reality	−0.063	0.628	−0.150	0.247	−0.156	0.231	−0.077	0.557
Paranoid symptoms	0.163	0.210	−0.201	0.121	−0.145	0.166	−0.145	0.166
Obsessive compulsive symptoms	0.039	0.703	−0.050	0.703	0.074	0.571	0.074	0.575
Ability decline	0.224	0.083	−0.059	0.649	0.023	0.861	0.158	0.225
Hopelessness	0.378	0.003#	−0.092	0.481	0.084	0.518	0.240	0.006#
Inferiority	0.030	0.817	0.012	0.924	0.027	0.837	−0.113	0.384

Notes: *$P<0.05$; #$P<0.01$.
Abbreviations: HAMD, Hamilton Depression Rating Scale; MPV, mean platelet volume; PLT, platelet; PCT, plateletcrit; PDW, platelet distribution width.

Table 4 The Correlation Analysis Between the MPVand HAMD Factor Score in the Depression Group

HAMD	MPV	
	r	P
Anxiety/somatization	0.259	0.044*
Weight	0.249	0.053
Cognitive disturbance	0.194	0.133
Change (day and night)	−0.015	0.909
Sluggish	0.181	0.162
Somnipathy	0.064	0.626
Hopelessness	0.321	0.012*

Note: *$P<0.05$.
Abbreviations: HAMD, Hamilton Depression Rating Scale; MPV, mean platelet volume.

Table 5 Comparison of CRP Level in Two Groups

	n	CRP (mg/L)	Z	P
Depression group	61	2.50 (2.50,3.74)	−3.495	0.000*
Control group	30	2.50 (2.50,2.50)		

Note: *$P<0.05$.
Abbreviation: CRP, C-reactive protein.

impairment in these patients, and the correlation coefficient was 0.256, P = 0.046 (P < 0.05; Table 7).

Discussion

In this study, platelet activation and chronic inflammatory response were observed by measuring platelet parameters and CRP levels to assess the association of these factors with the clinical phenotype of depression.

First, we found that a larger proportion of patients with depression were female than male, indicating that women are at higher risk of depression; this is consistent with most existing findings.[19] Second, the patients with depression in our study had a lower BMI than the healthy control subjects, as was also the case in Lawl's research.[20–22] This finding, with support from the existing literature, indicates that weight loss may be an element of the inflammatory suppression link in depression.[21] This could be because individuals with higher BMIs can consume more nutrients, which can eventually increase central serotonin activity and reduce depressive symptoms.[22] In contrast, however,

Table 6 The Correlation Analysis Between C-Reactive Protein (CRP) and HAMD Factor Score in the Depression Group

HAMD	CRP	
	Correlation Coefficient	*P*
Depressed mood	0.038	0.773
Guilty	0.340	0.007*
Suicide	0.038	0.773
Difficulty falling asleep	0.207	0.109
Light sleep	0.089	0.494
Early awakening	−0.180	0.165
Work and interest	0.003	0.983
Sluggish	−0.098	0.452
Agitation	0.071	0.586
Psychic anxiety	0.139	0.286
Somatic anxiety	0.194	0.133
Gastrointestinal symptoms	0.011	0.934
Constitutional symptoms	0.130	0.318
Sexual symptoms	−0.063	0.631
Hypochondriasis	0.175	0.177
Loss of weight	0.125	0.336
Self-conciousness	−0.017	0.897
Change (day and night)	0.052	0.689
Disintegration of personality or reality	0.180	0.166
Paranoid symptoms	0.126	0.333
Obsessive compulsive symptoms	0.015	0.909
Ability decline	0.162	0.213
Hopelessness	0.223	0.083
Inferiority	0.136	0.298

Note: *$P<0.05$.
Abbreviations: HAMD, Hamilton Depression Rating Scale; CRP, C-reactive protein.

Table 7 The Correlation Analysis Between C-Reactive Protein and HAMD Factor Score in the Depression Group

HAMD	CRP	
	Correlation Coefficient	*P*
Anxiety/somatization	0.191	0.140
Weight	0.150	0.249
Cognitive disturbance	0.256	0.046*
Change (day and night)	0.098	0.453
Sluggish	−0.010	0.937
Somnipathy	0.005	0.971
Hopelessness	0.203	0.116

Note: *$P<0.05$.
Abbreviations: HAMD, Hamilton Depression Rating Scale; CRP, C-reactive protein.

one study found that patients with atypical depression had higher BMI than control subjects.[23]

In the current study, the MPV levels in the severe depression group (HAMD > 35) were higher than those in the mild and moderate depression groups and the healthy control subjects, indicating that MPV is increased in patients with severe depression. Cai et al's study,[24] which compared 103 patients with MDD and 106 healthy subjects, showed elevated MPV in the MDD group compared with the healthy controls, with no significant difference between the PLT values for the two groups. These results are consistent with the idea that elevated MPV mainly reflects platelet activation and the chronic inflammatory response in vivo. Considering the results of the current study, this could lead to the significantly increased platelet activation and chronic inflammatory response in MDD. With an increase of MPV, platelets are further activated to release 5-HT into the serum, causing a relative increase of 5-HT in the serum. This is consistent with previous studies showing a decrease of 5-HT in platelets and the neurosynaptic space in patients with depression.[25] In the current study, we also found that, in patients with depression, MPV was positively correlated with HAMD-scale scores for gastrointestinal symptoms, work and interest, despair, and anxiety/somatization factors. Recent gastrointestinal studies have suggested a positive association of MPV with cirrhosis, gastric ulcers, and chronic gastritis with *Helicobacter pylori* infection,[26–28] indicating that an increase in MPV may result from the enhancement of chronic inflammation. Although there have been no reports of MPV treatment in patients with MDD, some scholars have proposed that anti-inflammatory treatment can have a good effect on depression.[29]

In the current study, PDW in patients with depression was found to be positively associated with gastrointestinal and constitutional symptoms, as well as hopelessness, in the HAMD scale. This is similar to this correlation study of MPV with each scale. Previous studies have also noted elevated PDW and PCT in patients with inflammatory bowel disease compared with healthy control subjects.[30] Additionally, Yang et al[31] showed that patients with depression had increased MPV and PDW compared with control subjects, suggesting the possible mechanism of these parameters enhancing platelet activity, eventually leading to depression. Patients with depression are prone to systemic symptoms, despair, somatic anxiety, and various other symptoms. However, there is a lack of direct clinical and animal studies concerning PDW and systemic symptoms, despair, and somatic anxiety; therefore, the relationships between PDW and these factors require further investigation. Our

findings also indicated negative correlations of PLT and PCT with the suspected illness and poor sleep factors of the HAMD scale in patients with depression. No study has directly pointed out a correlation of PLT and PCT with insomnia and disease suspicion; however, some researchers have found that PLT is significantly reduced in patients with obstructive sleep apnea syndrome, while MPV and PDW increase.[32] As PCT is the product of MPV and PLT, and PCT changes are generally consistent with PLT changes,[33] it can be speculated that PCT is negatively associated with poor sleep.

No significant differences in PDW, PLT, or PCT results for the different groups were found in the current study; the findings confirmed only elevated MPV in patients with severe depression compared with the control subjects. It is likely that, in cases of severe depression, the abilities of MPV to activate platelets and respond to chronic inflammation are strong, while the other three parameters may respond more slowly in patients with depression. Additional large clinical sample studies are required for clarity on the association of these indicators with depression.

This study found elevated CRP in patients with depression compared with healthy control subjects, which is consistent with findings from large samples in clinical studies.[34,35] Our findings indicated a positive association of CRP content with the guilt and cognitive disturbance factor scores in the HAMD scale for patients with depression; as CRP content increased in these patients, their guilt and awareness impairment factor scores also increased. The HAMD recognition disorder factor score encompasses guilt, shock, and paranoid symptoms, so an increased sense of guilt may also increase the recognition disorder factor score. Hu et al[36] reported a positive correlation between patients with depression and the mental anxiety, guilt, and shock scores in the HAMD scale, which is consistent with the results of the current study.

A clinical study by Köhler showed that combining selective serotonin reuptake inhibitors with anti-inflammatory agents resulted in improved treatment effects for depression.[37] However, research on such medication combinations is still relatively limited, and we hope to provide new ideas for treatments using anti-inflammatory and antidepressant drugs in the future.

The present study had some limitations. First, the sample size was small; future research should include larger sample sizes and multicenter clinical studies. Second, for the classification of depressive symptoms in future studies, it is necessary to control for confounders that could potentially interfere with the immunodepression relationship. This will allow for further exploration of the physiopathological mechanisms linking CRP, classical platelet parameters, and elements of the clinical phenotype of depression (gastrointestinal tract, sleep, disease suspicion, etc.) and for identification of the cellular metabolic pathways that mediate these changes.

Conclusion

Classical platelet parameters (PLT, MPV, PCT, PDW) and CRP were shown to be associated with specific depressive symptoms and cognitive impairment factors, including sleep, gastrointestinal symptoms, hypochondriasis, losing interest in work, and despair. These results suggest that both platelet parameters and CRP could be suitable biomarkers for predicting the occurrence and prognosis of depression, thus providing a new target for its treatment.

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Disclosure

The authors declare that they have no competing interests.

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