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Biomarkers in Cardiovascular Disease: A Cross-sectional Study on the Role of Interleukin-6 in Predicting Stress, Depression, and Optimism in Cardiovascular Diseases

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Dear Editor,

Coronary artery disease (CAD) is one of the most important health issues worldwide and is prevalent among Asians (1). In addition, CAD is still the leading cause of mortality and health-care cost around the world. About 2 million individuals have CAD in Iran and it emerges in the population 10 years earlier than the other countries (2). The most important psychological factors for cardiovascular diseases are stress, depression, and optimism/pessimism. Further, there is evidence that plasma interleukin (IL)-6 level predicts mortality in patients with heart failure and IL-6 level is associated with CAD. Therefore, the current study aimed at investigating the association between the psychological factors such as stress, depression, optimism, and the levels of immunological contents including IL-6 and white blood cell (WBC) counts in patients with CAD.

The current case-series study was accomplished to evaluate eligible patients admitted to the coronary care unit of Rajaei general hospital, Karaj, Iran from March to July 2017, who were selected by a respondent-driven sampling method (3). All patients with ≥60% coronary artery stenosis in coronary angiogram who showed consent for participation were included (N=110), then 21 cases were excluded due to other diseases. The exclusion criteria were having diabetes, immune deficiencies, inflammatory diseases, renal diseases, and other forms of heart disease. Perceived stress, depression, optimism, pessimism, IL-6 levels, and coronary arteries stenosis severity were measured using the perceived stress scale, Beck depression scale, life orientation test-revised, R&D immunological kits for IL-6 and angiography, respectively. The blood samples were collected (5 mL) after interviews at 9:00-11:00 AM and sent to the laboratory to assess the inflammatory marker (IL-6). Then, WBC count was measured and the sample was centrifuged at 4°C, followed by storing the serum at -20°C. Next, IL-6 was measured according to the user's guide of R&D Human IL-6 Immunoassay Quantikine® ELISA (R&D Systems, Minneapolis). Then, data were analyzed through Pearson's correlation and coincidence regression using SPSS, version 20. All stages of the research were performed after obtaining informed consent from the patient and based on the Declaration of Helsinki (4).

The majority of patients (67.4%) were males and the mean age was 55.93 ± 5.87 years. All the subjects received aspirin and statins. The results of the Pearson's correlation test are presented in Table 1. The results of coincidence regression are provided in Table 2.

Table 1. Correlation of Stress, Depression, Optimism Scores and IL-6 Levels

	Stress	Depression	Optimism	WBC Count	CAD	IL-6
IL-6	0.337**	0.341**	-0.458**	0.294**	0.288**	-
Coronary stenosis severity	0.348**	0.367**	-0.455**	0.190	-	
WBC count	0.307**	0.109	-0.180	-		
Optimism score	-0.599**	-0.501**	-			
Depression score	0.630**	-				
Stress score	-					

Note. *P<0.05; **P<0.01; IL-6: Interleukin-6; WBC: White blood cell count; CAD: Coronary artery disease.

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Table 2. Coincidence Regression in Predicting the IL-6 Level Severity of Coronary Artery Stenosis to Stress, Depression, and Optimism

Predicting Variable	IL-6			CAD			WBC		
	B	SE Beta	β	B	SE Beta	β	B	SE Beta	β
Stress	0.003	0.002	0.185	0.158	0.305	0.068	0.220	0.086	0.390*
Depression	0.001	0.003	0.020	0.307	0.346	0.117	-0.108	0.098	-0.176
Optimism	-0.011	0.004	-0.335**	-0.513	0.563	-0.344**	-0.054	0.151	-0.053
F value		8.637**			8.157**			3.054*	
R^2		0.234			0.224			0.110	

Note. **P<0.01, *P<0.05; IL-6: Interleukin-6; CAD: Coronary artery disease; WBC: White blood cells; SE: Sum of errors.

The results showed that higher levels of IL-6 and more severity of coronary artery stenosis were significantly associated with higher stress and depression scores, along with the lower score of optimism (all P-values<0.01). Among the three evaluated psychological factors, only stress had a positive significant relationship with WBC count (P<0.01).

The results of the study by Golimbet et al (5) showed that the association between the IL-6 -174G/C and depression comorbid to *coronary heart disease*, which is consistent with the results of the present study. Furthermore, in the study of Lamers et al (6), cross-sectional and bidirectional longitudinal associations were found between depression and IL-6 levels. Moreover, Murphy et al (7) reported an association between the IL-6 and anxiety. Thus, IL-6 could be a potential marker for patient profiling in personalized medicine approaches although the significance of this novel finding needs further investigations.

Conflict of Interests

None.

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