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Plasma Matrix Metalloproteinase-2 and Lower Depressive Symptoms in Patients Undergoing Hemodialysis

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Objectives : Depressive symptoms, linked to inflammation, have become more common, especially during the time of coronavirus disease 2019. The extracellular matrix (ECM) is crucial for tissue structure, and its degradation by MMP-2 and MMP-9 is involved in inflammation. End-stage renal disease (ESRD), often treated with hemodialysis (HD), is associated with a high prevalence of depression. This study explored the connection between plasma levels of MMP-2/MMP-9 and depression in HD patients.

Methods : We conducted cross-sectional and longitudinal studies to find out the relationship between plasma levels of MMP-2 and MMP-9 and depressive symptoms with a total of 172 HD and only 72 depression-negative HD patients, respectively. Depressive symptoms were assessed by Beck's depression inventory (BDI) questionnaire. Linear regression was used to examine the association between levels of MMP-2/MMP-9 and BDI scores. A Cox proportional hazards model was used to evaluate the risk of developing depressive symptoms.

Results : Linear regression analysis revealed a significant inverse association between MMP-2 levels and BDI scores (adjusted β = -2.469 [95% confidence interval (CI) -4.267 to -0.671]). Cox proportional hazards regression analysis showed that participants in the highest tertile of MMP-2 had a significantly lower risk of developing depressive symptoms over two years (Hazard Ratio = 0.280 [95% CI: 0.080 to 0.977]).

Conclusions : Our study concluded that there is a significant inverse association between low plasma levels of MMP-2 and baseline BDI scores. Those with highest tertile of MMP-2 showed significantly lower incidence of depressive symptoms over 2 years.

table 1.jpg

Linear Regression Analysis of MMP-2/MMP-9 Levels and Baseline BDI Scores.

BDI score	Unadjusted β (95% CI)	<i>P</i>	Adjusted β (95% CI)	<i>P</i>
MMP-2	-1.893 (-3.479 – -0.307)	0.020	-2.469 (-4.267 – -0.671)	0.008
MMP-9	0.759 (-0.850 – 2.367)	0.353	1.882 (-0.184 – 3.948)	0.074

MMP, Matrix Metalloproteinase; BDI, Beck's Depression Inventory; CI, Confidence Interval.

Adjusted for age, sex, BMI, KI comorbidity index, HD vintage, causes of end-stage renal disease.

table 1.jpg



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	Unadjusted	<i>P</i>	Adjusted	<i>P</i>
	HR (95% CI)		HR (95% CI)	
MMP-2 tertile 1	Reference		Reference	
MMP-2 tertile 2	0.729 (0.319 – 1.666)	0.454	0.820 (0.247 – 2.723)	0.746
MMP-2 tertile 3	0.439 (0.169 – 1.141)	0.091	0.280 (0.081 – 0.977)	0.046
MMP-9 tertile 1	Reference		Reference	
MMP-9 tertile 2	1.060 (0.437 – 2.574)	0.898	0.738 (0.230 – 2.367)	0.610
MMP-9 tertile 3	0.589 (0.237 – 1.463)	0.255	0.401 (0.119 – 1.353)	0.141

MMP, Matrix Metalloproteinase; CI, Confidence Interval; HR, Hazard Ratio.

Adjusted for age, sex, BMI, KI comorbidity index, HD vintage, and causes of end-stage renal disease.