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No effect of vitamin D supplementation on circulating concentrations of matrix metalloproteinase-9 (MMP-9) and tissue inhibitor of metalloproteinases-1 (TIMP-1) in adults aged 20–40 and ≥64 years

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Tissue matrix metalloproteinases participate in extracellular matrix remodelling and degradation. Increased expression of MMP-9 and its inhibitor TIMP-1 are linked to unfavourable cardiovascular conditions, including inflammatory damage leading to increased plaque instability[(1)]. Vitamin D insufficiency is associated with higher MMP-9 concentrations, while vitamin D supplementation has been shown to decrease circulating MMP-9 and TIMP-1 concentrations in vitamin D-deficient adults[(2)].

The effect of vitamin D supplementation (0, 5, 10 and 15 µg cholecalciferol/d) on MMP-9 and TIMP-1 concentrations was investigated in two randomised placebo-controlled double-blind 22-week intervention studies in men and women aged 20–40 years (*n* 215; during winter 2006–7[(3)]) and ≥64 years (*n* 215; during winter 2007–8[(4)]) from Cork and Coleraine. Fasting serum levels of MMP-9, TIMP-1 and 25-hydroxyvitamin D (25(OH)D) were measured by ELISA at baseline and end point.

	Treatment group (µg cholecalciferol/d)																
	Placebo				5				10				15				
	BL		EP		BL		EP		BL		EP		BL		EP		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	*P*
20–40 years	(*n* 56)				(*n* 50)				(*n* 57)				(*n* 52)				
MMP-9 (ng/ml)	237	175	187	147	222	177	183	150	242	200	197	166	238	17	210	185	0.381
TIMP-1 (ng/ml)	158	34	156	38	167	37	159	41	161	39	152	37	171	39	155	39	0.441
25(OH) D (nmol/l)	76.8	33	41.8[a]	18	71.3	27	53.4[b]	15	77.6	33	62.1[c]	22	79.7	30	72.4[d]	21	<0.001[(3)]
≥64 years	(*n* 56)				(*n* 51)				(*n* 57)				(*n* 51)				
MMP-9 (ng/ml)	205	189	251	233	188	192	211	203	197	206	196	187	180	172	229	228	0.603
TIMP-1 (ng/ml)	178	42	186	43	186	49	188	54	182	48	175	42	187	37	185	41	0.815
25(OH) D (nmol/l)	58.9	23	43.1[a]	17	57.9	23	58[b]	16	59.2	26	70.6[c]	18	53.73	18	76.2[c]	21	<0.001[(4)]

BL, baseline; EP, end point (EP). Means in a row with unlike superscript letters were significantly different ($P<0.001$).

ANOVA showed no baseline differences in the circulating concentrations of MMP-9, TIMP-1 or 25(OH)D between the four treatment groups. Baseline MMP-9 and TIMP-1 concentrations were significantly higher in adults aged 20–40 years ($P<0.001$) and adults aged ≥64 years ($P<0.01$) in Coleraine than in Cork. Linear regression analysis showed study centre to be the main predictor of MMP-9 (adjusted R^2 0.474; $P<0.001$) and TIMP-1 (adjusted R^2 0.326; $P<0.001$) concentrations in adults aged 20–40 years. In both age-groups pre- and post-intervention 25(OH)D concentrations were not associated with levels of MMP-9, TIMP-1 or MMP-9:TIMP-1. In both age-groups repeated measures analysis revealed no significant effect of the intervention on MMP-9 and TIMP-1 concentrations across the four groups, adjusting for centre, age, gender and BMI.

In conclusion, vitamin D supplementation had no effect on circulating MMP-9 and TIMP-1 concentrations in apparently-healthy adults aged 20–40 and ≥64 years.

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