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No effect of vitamin D supplementation on circulating glucose, insulin or homeostasis model of insulin resistance (HOMA-IR) in adults aged 20–40 years and ≥64 years

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Observational studies have shown that vitamin D insufficiency is associated with increased risk of type 2 diabetes, insulin resistance and higher plasma glucose concentrations(1); however, intervention trials to date have been limited(2,3). The effect of vitamin D supplementation (0, 5, 10 and 15 µg cholecalciferol/d) on serum glucose and insulin concentrations and the HOMA-IR 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(4)) and ≥64 years (*n* 215; during winter 2007–8(5)) in Cork and Coleraine. Fasting serum levels of glucose were measured by an enzymic colorimetric assay and fasting serum insulin, intact parathyroid hormone (iPTH), and 25-hydroxyvitamin D (25(OH)D) were measured by ELISA at baseline and end point.

Supplement dose ...	Group 1 Placebo				Group 2 5 µg/d				Group 3 10 µg/d				Group 4 15 µg/d				
	Baseline		End point		Baseline		End point		Baseline		End point		Baseline		End point		
	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)				
Glucose (mmol/l)	5.04	0.7	5.04	0.7	4.90	0.8	5.18	1.4	4.90	0.5	4.98	0.6	4.92	0.8	4.99	0.7	0.653
Insulin (µU/l)	14.2	8	15.2	8	15.1	9	15.2	7	15.0	9	14.1	6	15.9	10	14.4	6	0.275
HOMA-IR	3.3	2	3.5	2	3.4	2	3.5	2	3.4	2	3.2	2	3.6	3	3.2	2	0.350
25(OH)D (mmol/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	<0.0001(4)
≥64 years	(*n* 56)				(*n* 51)				(*n* 57)				(*n* 51)				
Glucose (mmol/l)	4.90	1.1	4.90	1.2	5.20	1.1	5.03	0.8	5.23	1.2	5.04	0.9	5.11	0.8	5.12	1.0	0.264
Insulin (µU/l)	9.1	8	11.9	11	12.6	17	11.7	15	11.1	10	12.6	14	10.6	7	11.3	10	0.926
HOMA-IR	2.1	3	2.8	3	2.9	4	2.7	3.4	2.6	3	2.9	3	2.4	2	2.6	2	0.958
25(OH)D (mmol/l)	59.3	23	43.1[a]	17	57.2	23	58.0[b]	16	59.3	26	70.6[c]	18	53.7	18	76.2[c]	21	<0.0001(5)

[a,b,c,d] Means with unlike subscript letters were significantly different across the four treatment groups ($P<0.05$).

ANOVA showed no baseline differences in serum levels of glucose, insulin, HOMA-IR or 25(OH)D between the four treatment groups. In adults aged 20–40 years linear regression analysis showed BMI as the main predictor of baseline serum glucose (β 0.344, $P<0.0001$), insulin (β 0.357, $P<0.0001$) and HOMA-IR (β 0.0.382, $P<0.0001$). Male gender was predictive of higher serum glucose concentration (β −0.184, $P<0.005$), while increasing age was predictive of lower insulin concentration (β −0.151, $P<0.025$). In adults aged ≥64 years BMI and iPTH were the main predictors of baseline serum glucose (β 0.184, $P<0.008$; β −0.204, $P<0.003$ respectively), whereas the main predictor for insulin and HOMA-IR was BMI (β 0.404, $P<0.0001$; β 0.409, $P<0.0001$ respectively). In both age-groups ANCOVA revealed no significant effect of the intervention on glucose, insulin or HOMA-IR concentrations across the four treatment groups, adjusting for centre, age, gender, BMI, vitamin D and calcium intakes, iPTH and 25(OH)D at baseline.

In conclusion, vitamin D supplementation had no effect on fasting serum glucose and insulin concentrations or the HOMA-IR in apparently-healthy adults aged 20–40 and ≥64 years.

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