

Effect of vitamin D supplementation on 25-hydroxyvitamin D status and parathyroid hormone concentrations in Brazilian women living in Southern England: a double-blind, randomised, controlled trial

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Vitamin D status is well recognised as an essential pro-hormone for optimum bone health and adequate status during wintertime can be particularly challenging for ethnic groups living in high latitudes⁽¹⁾. Low concentrations of 25-hydroxyvitamin (25(OH)D) are associated with a significant increase in parathyroid hormone (PTH). Therefore, the aim of the present study was to investigate the effect of vitamin D₃ supplementation on 25(OH)D status and PTH concentrations in Brazilian women living in Southern England.

In a double-blind randomized control trial (RCT), 56 women (age 35.75 ± 9.027 years) were supplemented with daily 15 µg vitamin D₃ or placebo, for 12 weeks during the wintertime.

At baseline, mean 25(OH)D concentrations were 36.06 ± 14.97 nmol/l, and 25% and 57.1% of women had 25(OH)D concentrations <25 nmol/l and <50 nmol/l, respectively. As shown in the Table below, mean 25(OH)D concentrations increased significantly in the supplemented group (+17.06 ± 17 nmol/l; *p* = 0.002), achieving a mean value above the inadequacy cut-off of ≥50 nmol/l⁽²⁾. As expected the increase in the placebo group was not statistically significant (*p* = 0.087). Post-intervention no participants had concentrations <25 nmol/l whereas 20.8% of the placebo group had concentrations below this threshold. Vitamin D intake from food was extremely low in both groups, but interestingly the placebo group had significantly higher intakes than the supplemented group post-intervention (3.46 ± 2.37 and 2.12 ± 1.18 respectively, *p* = 0.017). An Analysis of Covariance (ANCOVA) was carried out with post-intervention 25(OH)D as the dependent variable, the dichotomy of treatment group as the independent variable and baseline 25(OH)D as a covariate. There was a significant difference in post-intervention 25(OH)D concentrations between placebo and supplement, after having controlled for the baseline 25(OH)D [*F*(1,46), *p* = 0.002, partial eta squared = 0.2]. Both Intention-To-Treat (ITT), here presented, and Per-Protocol populations showed similar results for effectiveness of supplementation compared to placebo. Plasma PTH increased significantly in the placebo group (1.01 ± 2.2 pmol/l; *p* = 0.04) whilst vitamin D supplementation prevented this seasonal increase (baseline and post-intervention: 5.48 ± 2.53 and 5.98 ± 2.21 pmol/l; *p* = 0.253), although only in the ITT analysis.

	25(OH)D nmol/l ¹						Plasma PTH, pmol/l ¹					
	Baseline	SD	Post	SD	Change	SD	Baseline	SD	Post	SD	Change	SD
Placebo	34.79	14.42	41.07	17.70	5.53 ^f	15.18	5.26	1.35	6.44	2.15	1.01 ^e	2.29
15 µg/d	37.42	15.69	55.18	12.24	17.06 ^d	17.09	5.48	2.53	5.98	2.21	0.51 ^f	2.15
<i>p</i> ³	0.56 ^b		0.002 ^a		0.002 ^a		0.749 ^b		0.475 ^a		0.403 ²	

¹Values are means and SDs; ² ANCOVA. ³ Statistical analysis: ^a Independent t-test; ^b Mann-Whitney; ^c Paired t-test; ^d *p* = 0.000; ^e *p* = 0.04; ^f *p* > 0.05.

The results suggest that vitamin D supplementation of 15 µg/d maintained mean 25OHD concentrations above the inadequacy threshold (<50 nmol/l)⁽²⁾ and prevented vitamin D deficiency⁽³⁾ (<25 nmol/l) during winter months for Brazilian women living in England. Considering the limited food sources rich in vitamin D and the very low intake observed, supplementation during wintertime was shown to be an effective strategy to help this ethnic group achieve adequate vitamin D status when sunlight exposure is limited. The findings for PTH and the potential impact on bone health warrants further investigation.

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3. Scientific Advisory Committee on Nutrition (2016) *Vitamin D and Health*. Public Health England.