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Effect of probiotic and vitamin D supplementation on markers of vitamin D status and bone turnover in healthy adults

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There is some *in vitro* evidence that probiotic bacteria may influence Ca uptake in the intestine(1), possibly through an interaction with vitamin D endocrine system(2), with potential benefit for bone turnover. However, the effect of probiotic bacteria on bone turnover has not been investigated in human subjects. The objective of the present study was to examine the effect of 4-week supplementation with probiotics and vitamin D on serum 25-hydroxyvitamin D (S-25(OH)D), parathyroid hormone (PTH) and biochemical markers of bone turnover in healthy adults.

In a randomised double-blind placebo-controlled trial conducted in Dublin and Cork, 147 subjects aged between 18–63 years (seventy men and seventy-seven women) were randomised to receive daily for 4 weeks at two different intervention periods (November 2007 and April 2008): 15 μg cholecalciferol and 1×10^9 *Lactobacillus Salivarius*, *UCC 118* (probiotic); 15 μg cholecalciferol and probiotic placebo; cholecalciferol placebo and probiotic; cholecalciferol placebo and probiotic placebo. S-25(OH)D concentrations and serum concentrations of PTH, osteocalcin (OC), bone-specific alkaline phosphatase (BAP) as well as urinary concentrations of N-telopeptides of type I collagen (NTx) were assessed at baseline and post intervention using commercially-available ELISA kits. One-way between-groups analysis of covariance (ANCOVA) was used to examine the effect of treatment group on post-intervention biochemical variables while including age, gender, season of blood draw and baseline biochemical concentrations as covariates.

	Treatment group								
	Vitamin D and probiotic (*n* 39)		Vitamin D and probiotic placebo (*n* 36)		Vitamin D placebo and probiotic (*n* 36)		Placebo (*n* 36)		
	Mean	Range	Mean	Range	Mean	Range	Mean	Range	*P**
S-25(OH)D (nmol/l)									
Pre	58.4	24.5–132	61.1	22.3–104	55.3	22.1–201	45.0	27.2–111	
Post	75.1[a]	39.3–143	76.3[a]	40.9–107	51.8[b]	25.6–264	46.2[b]	27.1–91.1	<0.001
S-PTH (pg/ml)									
Pre	75.4	40.9–150	82.4	34.0–171	83.3	43.1–172	82.7	40.7–154	
Post	66.6	36.6–130	85.7	44.0–167	83.1	34.3–190	74.5	34.5–148	0.160
Urinary NTx (nm BCE)									
Pre	416	143–1971	479	67–2070	404	163–5095	460	152–2120	
Post	509	170–2327	494	82–2979	379	117–3281	512	138–1366	0.958
S-BAP (U/l)									
Pre	29.6	18.0–70.3	30.0	14.3–71.2	25.8	16.2–88.6	27.5	16.1–63.5	
Post	28.8	16.7–55.7	30.5	13.7–72.8	27.5	13.4–73.9	28.2	15.3–75.4	0.977
S-OC (ng/ml)									
Pre	10.4	4.7–16.2	9.8	6.4–17.9	9.6	4.0–27.7	10.3	3.2–15.4	
Post	11.2	4.4–16.4	9.7	6.3–16.3	10.5	3.9–24.7	10.1	5.9–13.8	0.841

BCE, bone collagen equivalents.

[a,b] Values in rows with unlike superscript letters were significantly different (Tukey *post-hoc* test; $P<0.05$).

* Effect of treatment on post-intervention variables was assessed by ANCOVA including age, gender, season and baseline concentrations as covariates.

No significant baseline differences in biochemical variables across the treatment groups were observed. Vitamin D supplementation significantly increased S-25(OH)D concentrations. Vitamin D and/or probiotic supplementation had no effect on serum PTH or bone turnover markers concentrations. In conclusion, probiotics and/or vitamin D supplementation over 4 weeks appear to have no effect on the rate of bone turnover in apparently-healthy adults.

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1. Gilman J & Cashman KD (2006) *Curr Issues Intest Microbiol* **7**, 1–5.
2. Giuliano AR & Wood, RJ (1991) *Am J Physiol* **260**, G207–G212.