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Vitamin D status, body composition and physical activity in healthy young men

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Vitamin D deficiency and sub-optimal status are increasingly associated with unfavourable metabolic phenotypes including insulin resistance, type 2 diabetes and CVD⁽¹⁾. It has been reported that vitamin D is sequestered by adipose tissue⁽²⁾, resulting in lower vitamin D status in overweight and obese individuals^(3,4). The aim of the current study was to investigate the relationships between vitamin D status, body composition and physical activity (PA) in apparently healthy young men, aged 18–30 years, living in Northern Ireland.

A single fasting blood sample was taken from consenting volunteers (*n* 121) and serum 25-hydroxycholecalciferol [25(OH)D, nmol/l] was quantified as a measure of vitamin D status using HPLC MS (API 4000, Chromsystems, USA). Height and weight were measured and BMI calculated. Fat mass (FM, kg) and fat-free mass (FFM, kg) were measured using total body dual-energy X-ray absorptiometry (DXA) scans (Lunar Prodigy, GE Healthcare, UK). Levels of total PA (MET, h/d), including time (h) spent per day in leisure-time PA (LPA) and sedentary activity (SA) were assessed using a self-reported questionnaire.

For the group, mean (sd) age, weight, BMI, FM, FFM, LPA, TV, PA and 25(OH)D were 23.1 (3.4) years, 78.5 (13.7) kg, 24.9 (4.0) kg/m², 15.9 (8.8) kg, 59.1 (6.6) kg, 1.7 (1.2) h/d, 3.2 (1.7) h/d, 25.0 (16.1) MET h/d and 30.6 (16.7) nmol/l, respectively.

	25(OH)D (nmol/l)	BMI (kg/m ²)	FM (kg)	FFM (kg)	LPA (h/d)	SA (h/d)
BMI (kg/m ²)	0.15					
FM (kg)	-0.04	0.81**				
FFM (kg)	0.26**	0.56**	0.27**			
LPA (h/d)	0.23*	0.32**	0.11	0.28**		
SA (h/d)	-0.03	-0.04	0.03	-0.03	-0.05	
PA (MET h/d)	0.16	0.33**	0.17	0.24**	0.67**	-0.10

Values presented as partial correlation coefficients (*r*) controlling for season and age.

P*<0.05, *P*<0.01 (two-tailed).

Significant seasonal variation was observed in 25(OH)D, (*P* = 0.006, ANOVA). Vitamin D status was significantly higher in those sampled in the summer months (June–August), compared to those in spring (Mar–May) or winter (November–January) (*P* < 0.05, Tukey *post hoc* tests). After controlling for season and age, 25(OH)D concentration was positively correlated with FFM and also with LPA. BMI was positively correlated with both LPA and PA, an association driven by the correlations with FFM as opposed to FM.

In conclusion, in this group of healthy young males, vitamin D status was not associated with adiposity. In contrast vitamin D status was associated with FFM; an association, we speculate is explained by greater time spent outdoors among leaner volunteers. Improved vitamin D status would be an additional benefit of increasing outdoor physical activity and may contribute to the widely reported health benefits of PA.

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- Holick MF (2007) *New Eng J Med* **357**, 266–281.
- Wortsman J, Matsuoka LY, Chen TC *et al.* (2000) *Am J Clin Nutr* **72**, 690–693.
- Blum M, Dallal GE & Dawson-Hughes B (2008) *J Am College Nutr* **27**, 274–279.
- Lagunova Z, Porojnicu AC, Lindberg F *et al.* (2009) *Anticancer Res* **29**, 3713–3720.