

Vitamin D and muscle function in adolescents from the Young Hearts study

E. L. Carson¹, L. K. Pourshahidi¹, C. A. Boreham², J. J. Strain¹, M. S. Mulhern¹ and on behalf of the young hearts study group

¹Northern Ireland Centre for Food and Health (NICHE), University of Ulster, Coleraine, BT52 1SA and ²Cardiovascular Research Centre, Queen's University Belfast, Belfast, BT7 1NN

Low vitamin D status has been associated with impaired muscle strength and function⁽¹⁾, which can be corrected, in some cases, by repletion of vitamin D status⁽²⁾. Most studies have been conducted in elderly populations, investigating the prevention of age-related muscle loss^(3,4). There is a dearth of studies considering the effect of vitamin D status on muscle gain during adolescence, a critical period for growth^(5,6). The aim of the current study is to investigate the associations between vitamin D status and fat free mass (FFM), muscle strength and muscle power in 12 and 15 year old adolescents from the Young Hearts Study.

The Young Hearts Study is a representative sample (*n* 2017) of 12 and 15 year old Northern Irish males and females, recruited during 1999–2001. Of the main cohort, a total of 1015 adolescents had serum 25-hydroxyvitamin D (25(OH)D) concentrations available for the current analysis, quantified using enzyme linked immuno assay (OCTEIA[®], IDS, Ltd., UK.) Total skinfolds (TS; mm) were determined by measurements taken at 4 sites (biceps, triceps, suprailiac and subscapular), and were used to calculate absolute FFM (kg), as well as FFM relative to total body weight (%). Sargent jump test results were used to calculate peak power (W), using the Sayer's Equation. Muscle strength was measured by hand grip dynamometry (Takei Scientific Instrument Company Limited, Japan).

	% FFM		FFM (kg)		TS (mm)		Strength (kg)		Peak Power (W)	
	β	<i>P</i>	β	<i>P</i>	β	<i>P</i>	β	<i>P</i>	β	<i>P</i>
12-y-old males	-0.017	0.782	-0.001	0.990	0.020	0.194	0.001	0.982	-0.012	0.835
12-y-old females	0.037	0.558	0.030	0.629	-0.014	0.299	0.046	0.453	-0.122	0.026*
15-y-old males	0.075	0.248	0.013	0.836	0.000	0.996	0.166	0.008*	0.049	0.405
15-y-old females	-0.053	0.413	0.035	0.589	-0.003	0.834	0.016	0.802	-0.042	0.458

*Significant association with 25(OH)D concentration (*P* 0.05, linear regression), including physical activity as a covariate in each model. FFM (%) was included as an additional covariate in strength and power models.

Serum 25(OH)D concentrations were negatively associated with peak power, in 12 year old females only, and positively associated with strength in 15 year old males only. Vitamin D status was not a significant predictor of FFM or TS in any age-sex group. The difference between age-sex groups may reflect a fast changing hormone profile in males and females at this stage of life. These results add to the literature within the area of vitamin D and muscle function in adolescents and further research to investigate possible mechanisms is warranted in this population.

This work was funded by the Department for Employment and Learning. Ethical approval was obtained from the Research Ethics Committee, Queen's University Belfast and the study was conducted according to the guidelines laid down in the Declaration of Helsinki.

- Gallagher JC (2012) *J Clin Endocrinol Metab* **97**, 4366–4369.
- Stockton KA, Mengersen K, Paratz JD *et al.* (2011) *Osteoporos Int* **22**, 859–871.
- Wicherts IS, van Schoor NM, Boeke AJ *et al.* (2007) *J Clin Endocrinol Metab* **92**, 2058–2065.
- Houston DK, Toozé JA, Hausman DB *et al.* (2011) *J Gerontol A Biol Sci Med Sci* **66**, 430–436.
- Foo LH, Zhang Q, Zhu K *et al.* (2009) *Nut Epidemiol* **139**, 1002–1007.
- Ward KA, Das G, Roberts SA *et al.* (2010) *J Clin Endocrinol Metab* **95**, 4643–4651.