

## Relationship between vitamin D intake and sunshine exposure on the parameters of muscle strength and function in trained rugby players

T. R. Hill<sup>1</sup>, M. Foley<sup>1</sup>, S. Dahlen<sup>1</sup>, J. Gomez<sup>2</sup> and K. D. Cashman<sup>1</sup>

<sup>1</sup>*School of Food and Nutritional Science and* <sup>2</sup>*Department of Physical Education and Sport, Mardyke Arena, University College Cork, Ireland*

Inadequate vitamin D status [as assessed by the measurement of serum 25-hydroxyvitamin D (25OHD) levels] is known to influence muscle function in generally sedentary and moderately active elderly and adolescent subjects. There is a dearth of information on the indicators of vitamin D nutritional status (such as vitamin D intake, sunshine exposure and serum 25OHD levels) among very physically active individuals such as athletes and their association with physical performance. The objective of this study was to examine the relationship between dietary vitamin D intake and sunshine exposure on the parameters of muscle strength and function in trained rugby players.

Twenty trained male rugby players (aged 18–22 years) were recruited from the university rugby club to participate in this cross-sectional investigation. Each participant made one visit to the researchers at the School of Food and Nutritional Sciences during winter 2009/2010 (i.e. November–February), where dietary, sunshine, health and lifestyle information was ascertained by questionnaires. The habitual intake of Ca and vitamin D was estimated by a validated food frequency questionnaire, specifically developed for Irish adults<sup>(1)</sup>. Sunshine exposure habits from the previous summer was assessed by an interview administered 37-item questionnaire<sup>(2)</sup>, which assesses personal behaviours such as clothing habits, sunscreen use, outdoor activities and foreign vacations taken. Muscle strength and function tests (adjusted for body weight) were conducted at a designated gymnasium facility by a certified coach during October 2009. These tests included: the bench press test, wide-chins test, military press test, horizontal pull-up test, push-up test, 1-repetition maximum (RM) clean test (all indicators of muscle strength) and the long-standing jump test (indicator of muscle function). The participants performed each exercise with maximal effort until they were unable to perform a repetition with proper technique, which was judged by the investigator. Statistical analysis of the data was conducted using SPSS<sup>®</sup> for Windows<sup>™</sup> Version 15.0 (SPSS, Inc., Chicago, IL, USA). Pearson's correlation was used to explore the association between the indicator of vitamin D nutritional status (i.e. dietary intake and sunshine exposure variable) and muscle test parameter.

The mean dietary vitamin D intake for the group was 9.1 µg/d. Two subjects (10%) had vitamin D intakes below 5 µg/d, while 11 subjects (55%) had vitamin D intakes below 10 µg/d. There were no differences in sunshine exposure habits among the subjects based on the categorical questions (*n* 18/37 questions) on the sunshine exposure questionnaire (data not shown). However, the reported minutes spent outdoors during summer (including both leisure time and physical activity) showed considerable variation among the group (range 22–32 min/d). It is well known that creatine use improves muscle strength; however, our data revealed no significant differences in muscle test performances between creatine users (*n* 9) and non-users (*n* 11) (data not shown). There were no significant associations between dietary vitamin D intake and performance on any of the muscle strength and function tests (data not shown). However, there were significant positive associations between minutes spent outdoors during summer and performance on the horizontal pull-up test ( $P = 0.013$ ), push-up test ( $P = 0.029$ ) and 1-RM clean muscle strength test ( $P = 0.05$ ).

Our investigation, although exploratory may point to a positive association between vitamin D nutritional status and at least some indicators of muscle strength. These findings highlight the need for a study involving the assessment of serum 25OHD levels and the parameters of muscle strength and function in athletes.

1. Collins A, O'Brien MM, Flynn A *et al.* (2003) *Proc Nutr Soc* **62**, 21A.

2. Cullen B (2006) *MSc Thesis*, NUI, Cork.