

## EFFECTS OF VITAMIN D SUPPLEMENTATION IN VITAMIN D DEFICIENT MEN INVOLVED IN RESISTANCE TRAINING

Vahur ÖÖPIK, Lauri SAVOLAINEN, Saima TIMPMANN, Eve UNT, Martin MOOSES, Luule MEDIJAINEN, Lisette TÖNUTARE, Frederik ROSS, Märt LELLSAAR, Evelin MÄESTU, Anneli PIIR, Mihkel ZILMER  
University of Tartu, Tartu, Estonia

Corresponding author: Vahur Ööpik, e-mail: vahur.oopik@ut.ee

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**Introduction.** The prevalence of vitamin D (Vit-D) deficiency is high worldwide, especially in countries located at north and south latitudes above approximately 35 degrees. Vit-D supplementation has been shown to increase muscle strength in young adults. However, it remains unclear if Vit-D supplementation enhances the efficacy of resistance training (RT). The data regarding the impact of Vit-D supplementation on cardiorespiratory fitness in subjects with varying Vit-D status are controversial and there is lack of knowledge on the potential additive effect of Vit-D supplementation on anti-inflammatory responses to RT in Vit-D deficient young men.

**Aim.** The aim of the study was to test two hypotheses. First, we hypothesised that Vit-D supplementation would enhance the RT-induced increases in muscle strength and lean body mass (LBM) in Vit-D deficient young men. Our second hypothesis was that Vit-D supplementation would have a positive effect on cardiorespiratory fitness (measured as maximal rate of oxygen consumption;  $VO_2\max$ ) and potentiate anti-inflammatory effect of RT. Our hypotheses assume that these effects of Vit-D supplementation, if present, are more likely to occur in subjects with Vit-D deficiency than in individuals with normal Vit-D status.

**Material and methods.** Thirty-nine young healthy men (baseline serum  $25(OH)D < 50$  nmol/L) were quasi-randomly assigned to one of two groups that performed a 12-week supervised RT program concomitant with either Vit-D (8000 IU daily; VD) or placebo (PLC) supplementation. The RT program consisted of 7 exercises which were carried out on RT equipment. Energy and nutrient intake of the participants were monitored during the 2<sup>nd</sup>, 6<sup>th</sup> and 11<sup>th</sup> week of RT. A graded maximal exercise test on a motorized treadmill was used to determine  $VO_2\max$  before and after the 12-week RT program.

**Results.** During the 12-week RT, energy and nutrient (except Vit-D) intake and training loads did not differ in the two groups. Serum  $25(OH)D$  levels increased from  $36.3 \pm 9.2$  to  $142.4 \pm 21.9$  nmol/L ( $P < 0.05$ ) in VD group and remained unchanged between  $36.3 \pm 8.9$  and  $29.4 \pm 6.6$  nmol/L ( $P > 0.05$ ) in PLC group. Muscle strength (1-repetition maximum) increased ( $P < 0.05$ ) to an equal extent in the two groups in 5 exercises performed on RT equipment whereas strength gains in chest press and seated row were greater ( $P < 0.05$ ) in PLC compared to VD group. Total and regional LBM (measured by DXA scan) increased ( $P < 0.05$ ) equally in the two groups. Android fat mass decreased ( $P < 0.05$ ) in VD group only. Baseline  $VO_2\max$  did not differ in the two groups ( $50.2 \pm 4.8$  and  $49.7 \pm 5.5$  mL/kg/min in VD and PLC, respectively;  $p > 0.05$ ) and remained unchanged during the intervention. Serum interleukin-10/tumor necrosis factor alpha ratio, an indicator of chronic low-grade inflammation, increased significantly (30%,  $p = 0.007$ ; effect size 0.399) in VD but not in PLC group.

**Conclusions.** In young healthy Vit-D deficient men participating in 12-week supervised RT, daily Vit-D supplementation of 8000 IU rapidly (within 4 weeks) eliminates Vit-D deficiency and improves inflammatory status. However, it does not enhance RT-induced muscle strength or LBM gains, does not increase total or regional fat mass reductions, and has no impact on cardiorespiratory fitness.