

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

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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 2nd, 6th and 11th 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 ± 9.2 to 142.4 ± 21.9 nmol/L ($P < 0.05$) in VD group and remained unchanged between 36.3 ± 8.9 and 29.4 ± 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 ± 4.8 and 49.7 ± 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.