Effect of vitamin D supplements on vitamin D status and muscle strength among well trained students

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Introduction
Suboptimal vitamin D (25(OH)D) status may decrease muscle function and strength, and athletes are therefore recommended serum 25(OH)D>75 nmol/L. The purpose of this study was: 1) to determine the effect of a daily vitamin D3 supplement of two different doses on 25(OH)D level of well trained students with low-moderate 25(OH)D; and 2) to examine the effect of supplements on the students’ muscle strength.

Methods
Seventy-one students were screened for serum 25(OH)D in December, those with lowest levels were recruited to the study. At start 51 participants were randomly assigned to daily vitamin D3 supplements of 76 µg (LOW), 152 µg (HIGH) or placebo (PLA). Forty-four participants (28±5 years) completed 8 week supplement intervention in January and February, in the group LOW (n=15, 10 women; 5 men), HIGH (n=15, 8 women; 7 men) and PLA (n=14, 11 women; 3 men). Blood samples were analyzed for 25(OH)D, PTH, calcium, phosphate, creatinine, testosterone and SHBG at start, 4 and 8 weeks. Body composition was measured by DEXA scan, and vitamin D intake was calculated from food frequency questionnaire. Muscle strength was measured at start and 8 weeks by the following tests: one repetition maximum in bench and leg press; and maximal isometric strength in knee extension measured at 100 and 300 milliseconds, and the highest force recorded throughout the contraction.

Results
At start 25(OH)D levels (mean±SD) were 55±13 nmol/L (LOW), 53±15 (HIGH) and 52±14 (PLA). After 4 and 8 weeks respectively 25(OH)D levels were 91±21 and 91±20 nmol/L (LOW), 130±32 and 126±18 (HIGH) and 53±15 and 42±14 (PLA), (p<.001, ANOVA). There was a tendency to a faster increase in 25(OH)D among women compared to men. The participants’ relative dose of vitamin D (dose/bodyweight) correlated strongly with increase in 25(OH)D after 4 weeks (p=.000). There were no changes in muscle strength between the groups after 8 weeks, but there was an increase in bench press (p=.005) and leg press (p=.037) within the LOW group.

Discussion
The lower relative dose of vitamin D among women may explain the tendency towards a faster increase in 25(OH)D among them. We found that a daily supplement of 76 µg vitamin D3 for 4 weeks was adequate to obtain a 25(OH)D level>75 nmol/L. In this study the vitamin D supplements did not affect the muscle strength of well trained students.