

28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

The effect of combined jump training and collagen supplementation on bone mineral density in male and female elite cyclists

Hilkens, L.1,3, van Schijndel, N.1, Weijer, C.1,3, Decroix, L.2, Bons, J.3, van Loon, L.3, van Dijk, J.W.1

1 HAN University of Applied Sciences 2 Team Jumbo-Visma 3 Maastricht University Medical Centre+

INTRODUCTION:

Accumulating evidence indicates that most elite cyclists have low bone mineral density (BMD). Jumping exercise has been shown to improve BMD, although this has never been investigated in elite-level road-race cyclists. Collagen supplementation may augment the effect of jumping exercise on BMD, as collagen is a key component of bone tissue. The present study aimed to evaluate the effect of combined jump training and collagen supplementation on BMD in elite road-race cyclists.

METHODS:

In this open-label, randomized controlled study with two parallel groups, 36 young male (n=8) and female (n=28) elite cyclists (21±3 y, BMI 21±1 kg/m²) were allocated to either an intervention (INT: n=18) or a no treatment control (CON: n=18) group. The 18-wk intervention period, conducted during the off-season, consisted of 5-min jumping exercise bouts performed five times per week, with each exercise bout preceded by the ingestion of 15 g hydrolyzed collagen. Body composition, trabecular bone score (TBS), and BMD of the total hip, femoral neck, lumbar spine and whole body were assessed before and after the intervention period by dual-energy x-ray absorptiometry, along with serum bone turnover markers P1NP and CTX-I. The effect of the intervention on the dependent variables was assessed by using mixed model ANOVA, with time (pre- and post-intervention) as within-subject factor and treatment (CON vs INT) as between-subject factor.

RESULTS:

Compliance with the intervention was 3.5±0.9 sessions with collagen supplements per week (77% of planned sessions completed). Lean body mass increased to a similar extent (~2.6%; time-effect: P<0.001) in CON (from 46.3±7.8 to 47.5±7.5 kg) and INT (from 47.9±4.8 to 49.0±5.1 kg; time x treatment: P=0.78). In contrast, fat mass remained unchanged in CON (11.3±2.6 to 11.3±2.8 kg), while a decrease was noted in INT (12.0±3.9 to 10.5±3.7 kg; time x treatment: P<0.01). BMD of the femoral neck decreased in CON (from 0.789±0.104 to 0.774±0.095 g/cm²), while being preserved in INT (from 0.803±0.058 to 0.809±0.066 g/cm²; time x treatment, P<0.01). No differences between treatments were observed for changes in BMD at the total hip, lumbar spine and whole body (time x treatment, P>0.05 for all). TBS increased from 1.38±0.08 to 1.40±0.09 in CON and from 1.46±0.08 to 1.47±0.08 in INT, respectively (time effect: P<0.01), with no differences between treatments (time x treatment: P=0.33). Serum P1NP concentrations decreased to a similar extent in CON (83.6±24.8 to 71.4±23.1 ng/mL) and INT (82.8±30.7 to 66.3±30.6 ng/mL; time-effect, P<0.001; time x treatment, P=0.22). Serum CTX-I concentrations did not change over time, with no differences between treatments (time-effect, P=0.08; time x treatment, P=0.58).

CONCLUSION:

Frequent short bouts of jumping exercise combined with collagen supplementation beneficially affect femoral neck BMD in elite cyclists. As such, this intervention appears a promising strategy for mitigating the adverse effects of professional cycling on bone health.

Topic: Nutrition

Presentation: Oral

European Database of Sport Science (EDSS)

Supported by SporTools GmbH



27904