DIETARY INTAKE AND MUSCLE THICKNESS, STRENGTH AND QUALITY IN MASTER STRENGTH ATHLETES VS. UNTRAINED CONTROLS

Sallinen Janne¹, Ojanen Tommi², Karavirta Laura¹, Ahtiainen Juha¹, Hääkkinen Keijo¹
(University of Jyväskylä¹, Pajulahti Sports Center², Finland)

Introduction. Strength training can alleviate age-related loss of muscle strength (Wood et al. 2001). Dietary intake can support the trainability by increasing the body glycogen stores for energy and by stimulating the synthesis of muscle proteins (Campbell and Geik 2004). This study investigated the relationships between dietary intake and muscle thickness, strength and quality in male master strength athletes and age matched control men.

Methods. The study groups: 1) young controls (M26, 25.7±3.4 yrs, BMI 23.3±1.4 kg/m², n=10), 2) middle-aged strength athletes (MA52, 52.1±4.7 yrs, BMI 29.0±2.6 kg/m², n=9), 3) middle-aged controls (M52, 51.9±3.1 yrs, BMI 22.7±1.4 kg/m², n=11), 4) older strength athletes (MA72, 71.8±3.8 yrs, BMI 28.4±4.3 kg/m², n=8) and 5) older controls (M71, 70.6±3.3 yrs, BMI 24.7±1.3 kg/m², n=10). The athletes (national level throwers: shot put, discus and hammer) had a systematic strength training experience of 23±15 years. Maximal isometric bilateral leg extension strength (N) was recorded by leg dynamometer using the knee angle of 107 degrees. Vastus lateralis thickness (cm) was assessed with ultrasound (Aloka SSD-280 LS, Tokyo, Japan) and muscle quality by dividing strength by muscle thickness. Dietary intake was recorded by food diaries for 4 days using the Nutrica® nutrient-analysis software (version 3.11, The Social Insurance Institution of Finland, Turku, Finland). Group effect between groups was studied with 1-ANOVA and pair-wise comparisons with Post Hoc analysis (Tukey HSD). Relationships between the macronutrient intake and muscle thickness, strength and quality were studied with Spearman’s Correlation.

Results. Strength athletes showed greater maximal strength (M26: 2733±421 N, MA52: 4405±999 N, M52: 2782±738 N, MA72: 4193±1015 N, M71: 2217±362 N) and muscle quality than all the controls (p<0.001), but muscle thickness did not differ between the groups. Athletes showed higher dietary intake of energy (MJ: p<0.001) and fat (E%: p<0.05) but lower in carbohydrates (E%: p<0.01). Protein intake (g, g/kg) correlated (r=0.79 and 0.71, p<0.05) with maximal strength in MA72. Controlling of energy intake (partial correlation test) revealed the correlation (r=0.81, p<0.05) between protein intake (g/kg) and muscle quality in the MA72 group.

Discussion. Continuous strength training may preserve both muscle strength and quality in older men. Protein intake was positively related to muscle strength and quality in older strength athletes. The contribution of dietary protein to stimulate skeletal muscle protein synthesis may become stronger in older strength athletes due to their lowered testosterone concentrations and their high level of muscle mass with a large protein turnover component. The data supports the usefulness of strength training and balanced diet to alleviate age-related loss of muscle strength in the elderly.

References
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