

Fish oil enhances muscle strength and functional abilities after resistance training in elderly women: A preliminary study

T. Kamolrat, F. Thies and S. R. Gray

Institute of Medical Sciences, University of Aberdeen, Aberdeen, AB25 2ZD, UK

Anabolic resistance of muscle protein synthesis to resistance training⁽¹⁾ and nutrition⁽²⁾ has been proposed as a potential cause of sarcopenia. Fish oil supplementation increases muscle protein synthesis in response to insulin and amino acids in older adults⁽³⁾ and may improve adaptations to resistance training in older women. However, this needs to be confirmed by results obtained from placebo controlled trials⁽⁴⁾. The aim of the current study was to determine whether fish oil can enhance adaptations in skeletal muscle function after resistance training in elderly women.

A double-blind randomized placebo-controlled study design was used in this pilot study. Thirteen participants were randomly assigned to receive either 4 g fish oil (containing 1.7 g EPA and 0.4 g DHA) or 4 g control oil (olive oil) daily for 12 weeks. Participants also carried out resistance training twice a week for this period. Plasma profiles (i.e., phospholipid fatty acid composition, glucose, triglycerides, insulin and IL-6), a short performance battery test⁽⁵⁾, and isometric and isokinetic quadriceps muscle strength were determined pre- and post-intervention. Results are presented as means (SD).

	Pre- Intervention		Post-Intervention	
	Control oil (n = 6)	Fish oil (n = 7)	Control oil (n = 6)	Fish oil (n = 7)
Age (year)	70.8 (3.3)	67.7 (2.1)		
Isometric Strength (N/m)	104 (35.8)	90 (21.6)	119 (41.9)	122 (29.1)*
Gait Speed (m/s)	1.49 (0.15)	1.55 (0.15)	1.59 (0.17)	1.78 (0.13)*
Chair Rise Time (s)	11.1 (2.8)	8.7 (2.7)	8.7 (1.9)	6.8 (1.8)
EPA (% total fatty acids)	1.64 (0.62)	1.52 (0.68)	1.46 (0.31)	5.13 (2.55)*
HOMA-IR	0.38 (0.47)	0.76 (0.4)	0.64 (0.39)	0.57 (0.55)*
Triglycerides (mmol/l)	1.42 (0.53)	1.71 (1.12)	1.24 (0.53)	1.44 (0.61)
IL-6 (pg/ml)	1.73 (0.90)	1.74 (0.50)	1.47 (0.50)	1.51 (0.40)

* Denotes a significant difference between groups at post intervention ($P < 0.05$, ANCOVA)

All baseline measures were similar between groups. Plasma EPA and DPA concentrations significantly increased in the fish oil group, compared with the control ($P = 0.01$ and $P = 0.03$ respectively), while insulin resistance, as measured by HOMA-IR, significantly decreased ($P = 0.03$). Post-intervention, the fish oil group showed a greater increase in isometric muscle strength (31.8 ± 8.7 vs. 15 ± 9.6 N/m in fish oil and control groups, respectively; $P = 0.001$) and a gait speed (0.24 ± 0.12 vs. 0.09 ± 0.11 m/s in fish oil and control group, respectively $P = 0.03$) compared with the control group (Table 1). However, post-intervention, there were no differences in isokinetic muscle strength, balance, chair rise time, or plasma IL-6 and triglyceride concentrations.

We have demonstrated that 12 weeks supplementation with 4 g fish oil daily enhance the adaptive responses to resistance exercise and reduce markers of insulin resistance in elderly women, suggesting that fish oil may be beneficial to attenuate age-related loss of muscle mass.

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