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The effect of long chain n-3 fatty acid supplementation on muscle strength in older adults: A systematic review and meta-analysis

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Muscle strength and mass decline as we age, typically starting around 35–40 years, and can eventually lead to the development of sarcopenia⁽¹⁾. There are currently no effective drug treatments available for either the prevention or treatment of this condition⁽²⁾ and whilst resistance exercise has efficacy⁽³⁾ its effectiveness is limited due to issues with uptake and adherence⁽⁴⁾. However, emerging research suggests that nutrition may offer a potentially effective approach to delay the age-related decline in muscle mass and function among older individuals⁽⁵⁾, with LCn-3 PUFA emerging as a strong candidate.

The main objective of the current study was to perform a systematic literature review with the purpose of exploring the impact of long-chain n-3 polyunsaturated fatty acid (LCn-3 PUFA) relative to control oil supplementation on muscle strength, with secondary outcomes of muscle mass and physical function in older individuals under conditions of habitual physical activity/exercise.

The review protocol was registered with PROSPERO (CRD42021267011) and followed the guidelines outlined in the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement⁽⁶⁾. The search for relevant studies was performed utilizing databases such as PubMed, EMBASE, CINAHL, Scopus, Web of Science, and the Cochrane Central Register of Controlled Trials (CENTRAL) up to June 2023. Randomized controlled trials (RCTs) in older adults comparing the effects of LCn-3 PUFA with a control oil supplement on muscle strength were included.

Five studies^(7,8,9,10,11) involving a total of 488 participants (348 females and 140 males) were identified that met the specified inclusion criteria and were included. Upon analyzing the collective data from these studies, it was observed that supplementation with LCn-3 PUFA did not have a significant impact on grip strength (standardized mean difference (SMD) 0.61, 95% confidence interval [−0.05, 1.27]; $p = 0.07$) in comparison to the control group. However, there was a considerable level of heterogeneity among the studies ($I^2 = 90\%$; $p < 0.001$). As secondary outcomes were only measured in a few studies, with significant heterogeneity in methods, meta-analyses of muscle mass and functional abilities were not performed. Papers with measures of knee extensor muscle mass as an outcome ($n = 3$) found increases with LCn-3 PUFA supplementation, but studies measuring whole body lean/muscle mass ($n = 2$) and functional abilities ($n = 4$) reported mixed results.

With a limited number of studies, our data indicate that LCn-3 PUFA supplementation has no effect on muscle strength or functional abilities in older adults but may increase muscle mass, although, with only a few studies and considerable heterogeneity, further work is needed to confirm these findings.

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