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The effect of n-3 polyunsaturated fatty acids on muscle mass, strength and performance: a meta-analysis

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Sarcopenia increases the risk of frailty, falls, poor quality of life (QoL), non-communicable disease, hospitalizations and death, placing an obvious burden on health care services[1,2]. Increased intake of *n-3* polyunsaturated fatty acids (PUFA) may improve muscle mass, strength and function, as key markers of sarcopenia[3] but previous meta-analyses have not showed consensus on these measures. We performed a meta-analysis of randomized controlled trials (RCTs) on *n-3* PUFA supplementation on our primary outcomes of muscle mass and strength, and secondary outcomes of functional strength and performance. We followed PRISMA guidelines and the Cochrane quality assessment tool and searched ISI, Scopus and PubMed databases with terms related to *n-3* PUFA, muscle mass, strength, and functional performance. Weighted mean differences (WMD), 95% confidence intervals, random-effect model analysis, and I^2 statistic were used to assess outcomes and heterogeneity respectively. Our search revealed an initial 6907 RCTs, but was reduced to 72 (total participants, n = 7433) after applying our inclusion and exclusion criteria. Studies ranged from 30 days to 3 y, with a dose range of ~ 0.6 to 5 g of *n-3* PUFA, predominantly in populations > 60 y.

Meta-analyses revealed no significant effects on the primary meta-analyses on various tests of muscle mass (e.g. lean mass, fat free mass, skeletal muscle mass) or handgrip strength (HGS), but subgroup analysis of HGS on age (< ≥ 65 y, WMD:1.36 kg; 95% CI: -2.11, -0.61; $I^2 = 75.4\%$, $p < 0.001$) showed a significant unfavorable effect of *n-3* PUFA. However, our primary meta-analyses for the 30s Chair Stand Test (30CST) (WMD: 2.23 repetitions; 95% CI: 1.34, 3.32; $I^2 = 67.6\%$, $p < 0.001$) and the Timed Up and Go Test (TUG) favoured *n-3* PUFA (WMD: -0.35 s; 95% CI: -0.53, -0.18; $I^2 = 0.0\%$, $p < 0.001$). Subgroup analysis for TUG was significant for BMI ≥ 25 kg/m^2 (WMD: -0.36 s; 95% CI: -0.58, -0.17; $I^2 = 16.9\%$), and for 30CST by duration ≥ 16 weeks (WMD: 2.60 reps; 95% CI: 1.37, 3.83; $I^2 = 0.0\%$) and female sex (WMD: 2.92 reps; 95% CI: 2.37, 3.46; $I^2 = 33.1\%$) (all $p < 0.001$).

Publication bias was minimal and sensitivity analysis did not influence findings. In conclusion, we show no effect of *n-3* PUFA supplementation on our primary outcome of muscle mass, and the negative effect on HGS may be of limited clinical significance[4]. The favourable effects on 30CST and TUG show promise for *n*-3 PUFA as an intervention to improve regular daily activities and hence QoL. Both these measures are reliant on balance, which *n-3* PUFA may improve via neuromuscular mechanisms. Further studies are needed to elucidate the dose, type, duration, other influencing factors, and the mechanism of action for functional strength.

References

1. Li R, Xia J, Zhang ZI, *et al.* (2018) *Med Sci Sports Exerc* **50**(3), 458–467.
2. Tournadre A, Vial G, Capel F, *et al.* (2019) *Joint Bone Spine* **86**(3), 309–314.
3. Dupont J, Dedeyne L, Dalle S, *et al.* (2019) *Aging Clin Exp Res* **31**(6), 825–836.
4. McGrath R, Johnson N, Klawitter L, *et al.* (2020) *SAGE Open Med* **8**.