The effect of *n-3* polyunsaturated fatty acids on muscle mass, strength and performance: a meta-analysis. By I. G. Davies[1], D. McCullough[2], K. E. Lane[1], and M. Mazidi[3]. [1]Research Institute for Sport and Exercise Sciences, *School of Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom L3 1AA.* [2]*Carnegie School of Sport, Leeds Beckett University, Leeds, LS1 3HE.* [3]*Clinical Trial Service Unit & Epidemiological Studies Unit (CTSU), Nuffield Department of Population Health, University of Oxford, Oxford, U.K, OX3 7LF.*

Sarcopenia increases the risk of frailty, poor quality of life (QoL), non-communicable disease, hospitalizations, and death [1, 2]. Increased intake of *n-3* polyunsaturated fatty acids (PUFA) may improve key markers of sarcopenia (muscle mass, strength and function)[3] but previous meta-analyses have not showed any consensus. We performed a meta-analysis of randomized controlled trials (RCTs) on *n-3* PUFA supplementation on primary outcomes of muscle mass and strength, and secondary outcomes of functional strength. 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.

Searches 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 lean mass, fat free mass, skeletal muscle mass or handgrip strength (HGS). 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, 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. Further studies are needed to elucidate the dose, duration and other influencing factors on muscle quality.

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