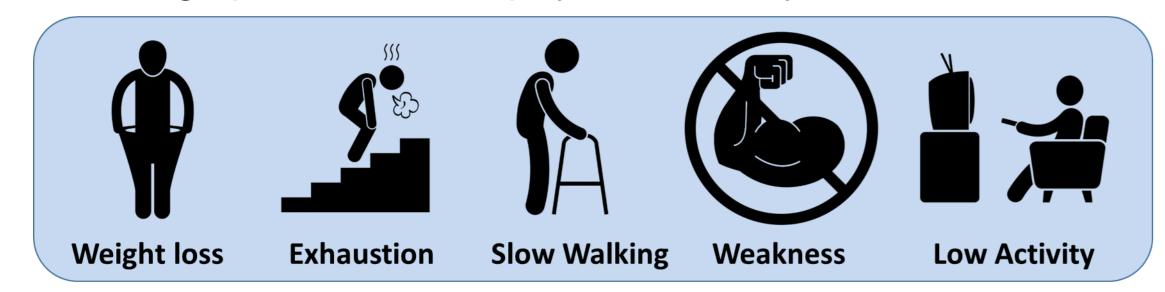


Background

A major public health concern for our ever ageing population is to remain independent. An important element of maintaining independence in older adults is the preservation of mobility along with muscle mass and strength.

A key concept linked to musculoskeletal ageing is frailty. The commonly acknowledged characteristics include unintentional weight loss, self-reported exhaustion, weakness (grip strength), slow walking speed, and low physical activity.



Muscle mass decline is one of the hallmarks of ageing with an annual decline in functional capacity of up to 3% per year after age 60.

Dietary supplementation of fish derived omega-3 polyunsaturated fatty acids (PUFAs), have shown to have a beneficial effect on skeletal muscle mass and strength.

PUFAs are of particular interest in the context of frailty, given their well-known anti-inflammatory role and the consensus of an inflammatory contribution to frailty, with differences in the levels of pro-inflammatory cytokines between frail and non-frail elderly reported.

Objective

To examine the effect of dietary omega-3 supplementation on frailty traits and associated biomarkers in medically stable older adults.

References

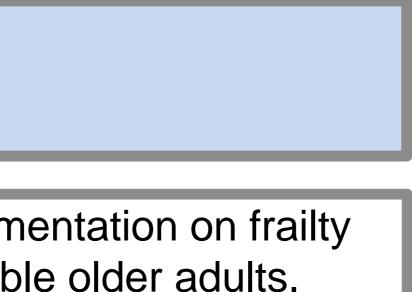
. Boit M, et al. Am J Clin Nutr 2017; 105(1):[151-8 pp.]. 2. Ciubotaru I, et al. J Nutr Biochem. 2003;14(9):513-21. 3. Grieger JA, et al. Food and Nutrition Research. 2014;58 (20369).4. Hutchins-Wiese H, et al. J Nutr Health Aging 2013; 17(1):[76-80 pp.]. 5. Kamolrat T, et al. Proc Nutr Soc. 2013;72:E97. 6. Krzyminska-Siemaszko R, et al. Int J Environ Res Public Health. 2015;12(9):10558-74. 7. Mesa MD, et al. Oxid Med Cell Longev. 2015;2015:5709312. 8. Pipingas A, et al. Journal of Functional Foods. 2015;19:949-57.9. Smith G, et al. Am J Clin Nutr 2011; 93(2):[402-12 pp]. 10. Strike SC, et al. J Gerontol A Biol Sci Med Sci. 2016;71(2):236-42.11.Tartibian B, et al. Nutr Metab (Lond). 2011;8:71.

Author Name Joanne Stocks PhD Joanne Stocks@nottingham.ac.uk

This is a summary of independent research funded by the National Institute for Health Research at its NIHR Nottingham Biomedical Research Centre. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

A meta-analysis of the effect of dietary omega-3 fatty acid supplementation on walking speed and inflammatory markers in older healthy adults Joanne Stocks¹²³ and Ana Valdes^{1,2,3}

¹NIHR Nottingham Biomedical Research Centre; ²Arthritis Research UK Pain Centre, ³Division of Rheumatology, Orthopaedics and Dermatology, School of Medicine, University of Nottingham



Method

A meta-analysis of randomised controlled trials published up to October 2017 in 5 databases was carried out.

- **Participants**: Medically stable postmenopausal or older people with the majority of participants over 60 years of age.
- Intervention: Omega-3 PUFA supplementation
- **Comparator:** Placebo-controlled groups
- **Outcome:** One or more inflammatory biomarkers or frailty traits.

The results were pooled using a random-effects meta-analysis with standardised mean differences. PROSPERO registration number: CRD42017080240

Results

13 studies met the inclusion/exclusion criteria but not all frailty traits or associated biomarkers were measured in all studies.

In 5 studies that analysed 261 patients, omega-3 fatty acid supplementation was associated with a significant improvement in walking speed with a pooled effect size of 0.27 (95% CI, 0.02, 0.52; P= 0.04: *Figure 1*)

A significant lowering effect was observed for C-reactive protein (CRP) levels in 5 trials of 310 patients with a pooled effect size of -0.62 (95% CI, -1.14, -0.10; P = 0.02: Figure 2).

The pooled effect sizes for the inflammatory cytokines TNF- α (5 trials; n=168), was -0.36 (95% CI, -1.09, 0.36; P=0.33; Figure 3) and for IL-6 (6 trials; n= 199), was -0.06 (95% CI, -0.55, 0.43; P=0.80; *Figure 4*) and were not found to be significant.



	Omega-3			Control			Std. Mean Difference		
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% Cl	
Da Boit 2017 Female	0.208	0.266	13	0.13	0.3761	10	9.4%	0.24 [-0.59, 1.06]	
Da Boit 2017 Male	0.253	0.275	14	0.123	0.334	13	11.0%	0.41 [-0.35, 1.18]	
Hitchins-Wiese 2013	0.03	0.195	85	-0.03	0.18	41	45.6%	0.31 [-0.06, 0.69]	
Kamolrat 2013	0.23	0.141	7	0.1	0.16	6	4.8%	0.81 [-0.35, 1.96]	
Kryminska 2015 LMM	0.11	0.26	11	0.09	0.13	9	8.2%	0.09 [-0.79, 0.97]	
Kryminska 2015 rLMM	0.18	0.49	15	0.28	0.66	10	10.0%	-0.17 [-0.97, 0.63]	
Strike 2016	0.03	0.245	15	-0.03	0.18	12	11.0%	0.27 [-0.50, 1.03]	
Total (95% CI)			160			101	100.0%	0.27 [0.02, 0.52]	
Heterogeneity: Tau² = 0. Test for overall effect: Z =	2010/03/00/03/9	18. – 2019 S.C.S.	8. 19 5	P = 0.88	3); I² = 0%	1			

Figure 1 Omega-3 supplementation versus control. Outcome: Walking Speed m/s. LMM= Low Muscle Mass; rLMM= risk of Low Muscle Mass

	Or	Control			
Study or Subgroup	Mean	SD	Total	Mean	SD
Ciubotaru 2003 high	-0.94	1.475	8	1	1.698
Ciubotaru 2003 low	-0.7	2.413	8	1	1.698
Grieger 2014	-0.185	0.333	43	0	0.308
Hitchins-Wiese 2013	-0.09	1.964	85	0	1.65
Mesa 2016	-1.05	0.38	14	-0.14	1.928
Pipingas 2014	0	2.271	18	-0.2	1.928
Total (95% CI)			176		
Heterogeneity: Tau ² = (0.07; Chi ^z	= 8.63,	df = 5 (P = 0.13	2); I ² = 4
Test for overall effect: Z	. = 2.26 (F	P = 0.02)		

Figure 3 Omega-3 supplementation versus control. Outcome: CRP (mg/L) CRP= C-reactive protein. High and low fish oil concentrations presented for Ciubotaru 2013

	3	Contr			
Study or Subgroup	Mean	SD	Total	Mean	1
Da Boit 2017 Female	-0.12	2.283	12	-0.14	2.
Da Boit 2017 Male	-0.35	1.873	13	-0.29	2.2
Mesa 2016	-0.54	0.862	14	-0.88	0.5
Pipingas 2014	-0.1	0.556	18	0	0.4
Smith 2011	0.03	0.39	8	0.19	0.
Tartibian 2011	-42.6	27.57517	20	8.5	17.9
Total (95% CI)			85		
Heterogeneity: Tau ² = 0 Test for overall effect: Z	 30%*03%*0%04 	542 - 2019 2025 (C	= 5 (P	= 0.000	1); I²:

Figure 3 Omega-3 supplementation versus control. Outcome: TNFα (pg/ml) $TNF\alpha = Tumour Necrosis Factor alpha$

	0	mega-3	Control		
Study or Subgroup	Mean	SD	Total	Mean	SE
Ciubotaru 2003 high	-0.86	0.26	9	-1	0.376
Ciubotaru 2003 low	-1.73	0.458	10	-1	0.376
Da Boit 2017 Female	-0.2	2.113	12	0.19	1.067
Da Boit 2017 Male	-0.07	1.026	13	-0.46	0.578
Kamolrat 2013	-0.23	0.458	7	-0.26	0.781
Mesa 2016	14.1	7.053	14	4.4	16.919
Pipingas 2014	0.3	1.249	18	0.1	0.624
Tartibian 2011	-8	26.905	18	11.4	26.78

Total (95% CI) 101 Heterogeneity: Tau² = 0.31; Chi² = 19.49, df = 7 (P = 0.007); l² = 64% Test for overall effect: Z = 0.25 (P = 0.80)

Figure 4 Omega-3 supplementation versus control. Outcome: IL-6 (pg/ml). *IL-6= Interleukin-6. High and low fish oil concentrations presented for Ciubotaru 2013*

Conclusion

These results suggest that dietary omega-3 supplementation may have a beneficial effect on medically stable older people by improving walking speed and reducing some markers of systemic chronic inflammation.





