

INPLASY PROTOCOL

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Review Stage at time of this submission: Formal screening of search results against eligibility criteria.

An umbrella review of systematic reviews and meta-analyses of omega-3 fatty acids supplementation: effects on lean mass and muscle function

Nunes, EA¹; D'Souza, AC²; Steen, J³; and Phillips, SM⁴.

Rationale: Data have emerged suggesting that supplementation with n-3 fatty acids may benefit skeletal muscle. Work in younger and older adults has demonstrated that supplementing the diet with n-3 fatty acids for 8wk potentiated rates of mixed muscle protein synthesis in response to a hyperinsulinemic-hyperaminoacidemic clamp and increased bone and fat-free (lean) mass in free-living older men and women. There is also evidence that n-3 fatty acid supplementation enhances strength gains during resistance exercise training, an effect that appears more pronounced in women. With this review, we aim to arrive at a consensus, using an umbrella review of systematic reviews, on whether n-3 fatty acid supplementation affects skeletal muscle mass (or proxies such as lean mass and fat-free mass).

Condition being studied: n-3 lipid supplementation and effects on skeletal muscle and muscle function.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 03 June 2023 and was last updated on 06 June 2023 (registration number INPLASY202360012).

INTRODUCTION

Review question / Objective: Study Design

A. Only systematic reviews and meta-analyses are considered.

B. No narrative reviews or scoping reviews are considered.

Participants

Does the study involve adults aged ≥ 18 years?

Groups that may be covered:

A. Healthy older adults

B. Older adults within clinical populations

C. Clinical populations

Intervention

1. Does the study evaluate omega-3 fatty acids interventions?

2. Does the study evaluate the mechanisms of omega-3 fatty acids?

3. Are these interventions aimed at the prevention or treatment of sarcopenia?
4. Are the interventions aimed at treating people losing muscle mass due to disease?
6. Does the study report effects on sarcopenia-related outcomes?
7. Does the study report effects on ICU-related outcomes?

Omega-3 fatty acids supplementation includes:

1. Studies in which the effect of omega-3 fatty acids supplementation (as food or other form) is compared with no supplementation
2. Studies in which omega-3 fatty acids supplementation is added to an exercise program and compared with a control group of exercise without supplementation

Relevant outcomes include:

- A. Lean (muscle) mass
- B. Muscle strength
- C. Muscle endurance
- D. Flexibility
- E. Mobility
- F. Physical function
- G. Disability
- H. Function and participation

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METHODS

Search strategy: OVID Medline Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present – Jan 25th -2023. – 1599 results

1. omega 3 fatty acids.mp. or exp Fatty Acids, Omega-3/ 31883
 2. eicosapentaenoic acid.mp. or exp Eicosapentaenoic Acid/ 12564
 3. docosahexaenoic acid.mp. or exp Docosahexaenoic Acids/ 17300
 4. EPA.mp. 22400
 5. DHA.mp. 17282
 6. omega-3.mp. 26033
 7. systematic review.mp. or exp "Systematic Review"/ 288148
 8. meta-analysis.mp. or exp Meta-Analysis/ 265849
 9. n-3 fatty acids.mp. or exp Fatty Acids, Omega-3/ 30340
 10. fish-oil.mp. or exp Fish Oils/ 34648
 11. 1 or 2 or 3 or 4 or 5 or 6 or 9 or 10 66796
 12. 7 or 8 416669
 13. exp Body Composition/ or lean mass.mp. or exp Sarcopenia/ or exp Muscle, Skeletal/ 362283
 14. exp Body Composition/ or fat free mass.mp. 66631
 15. 13 or 14 365524
 16. 11 and 15 1599
- Embase 1974 to 2023 January 24 - Jan 25th -2023. – 323 results
- 15 13 and 14 323
 - 14 10 or 11 669780
 - 13 9 and 12 16886
 - 12 exp Body Composition/ or lean mass.mp. or exp Sarcopenia/ or exp Muscle, Skeletal/ or fat free mass.mp. 524543
 - 11 systematic review.mp. or exp "systematic review"/ 501183
 - 10 meta-analysis.mp. or exp meta analysis/ 394943
 - 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 675741
 - 8 n-3 fatty acids.mp. 5440
 - 7 fish-oil.mp. or exp fish oil/ 21422
 - 6 omega-3.mp. 45407
 - 5 DHA.mp. 22896
 - 4 EPA.mp. 25979
 - 3 docosahexaenoic acid.mp. or docosahexaenoic acid/ 28421

2 eicosapentaenoic acid.mp. or exp
icosapentaenoic acid/ 22522

1 exp fatty acid/ or exp omega-3 fatty acid/
646053

Web of Science Core Collection – Jan 25th
-2023 – 90 results

Entitlements:

- WOS.IC: 1993 to 2023
- WOS.CCR: 1985 to 2023
- WOS.SCI: 1976 to 2023
- WOS.AHCI: 1976 to 2023
- WOS.BHCI: 2005 to 2023
- WOS.BSCI: 2005 to 2023
- WOS.ESCI: 2018 to 2023
- WOS.ISTP: 1990 to 2023
- WOS.SSCI: 1976 to 2023
- WOS.ISSHP: 1990 to 2023

Searches:

1: ALL=(omega 3 fatty acids) Results: 34857

2: ALL=(eicosapentaenoic acid) Results:
19749

3: ALL=(docosahexaenoic acid) Results:
26730

4: ALL=(EPA) Results: 107079

5: ALL=(DHA) Results: 26197

6: ALL=(omega-3) Results: 32598

7: ALL=(systematic review) Results: 425703

8: ALL=(meta-analysis) Results: 294150

9: ALL=(n-3 fatty acids) Results: 26253

10: ALL=(fish-oil) Results: 26210

11: #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR
#9 OR #10 Results: 188045

12: #8 OR #7 Results: 569087

13: (((ALL=(lean mass)) OR ALL=(muscle
mass)) OR ALL=(fat free)) OR ALL=(muscle)
Results: 1074923

14: #11 AND #12 AND #13 Results: 90

SPORTDiscus – Filter: Academic Journals -
40 results

TX (omega-3 fatty acids or omega 3 or
omega-3 or fish oil or n-3 or pufa or epa or
dha or eicosapentaenoic or
docosahexaenoic) AND TX (fat-free mass
or lean mass or muscle mass or muscle or
strength) AND TX (review or meta-analysis
or systematic review).

Participant or population: Adults >18 years.

Intervention: N - 3 fatty acid
supplementation.

Comparator: Placebo (nothing) or an oil
that is not n-3.

Study designs to be included: Systematic
reviews.

Eligibility criteria: Adults >18yr taking n-3
fatty acids.

Information sources: Electronic databases:
MedLine, SCOPUS, CINAHL.

Main outcome(s): muscle mass, lean mass,
fat-free mass, strength.

Additional outcome(s): function,
sarcopenia-related outcomes.

Data management: All data are stored in
secure databases using coded Excel files.
References are de-duplicated using
EndNote.

Quality assessment / Risk of bias analysis:
Consensus Analysis strategy for Umbrella
Review

1. All reviews will be scored using the
AMSTAR (A Measurement Tool to Assess
Systematic Reviews) tool (Shea et al. BMC
Med Res Methodol.2007;7:10). This 11-item
tool assesses the degree to which review
methods avoided bias. The methodological
quality is rated as high (score 8–11),
moderate (score 4–7) or low (score 0–3).

2. To organize the evidence, authors will
systematically synthesize the extracted
data of each review. This results in
standardized effectiveness statements (i.e.,
sufficient evidence, some evidence,
insufficient evidence, insufficient evidence
to determine) about the treatment effect of
the interventions in the individual
systematic reviews.

3. The quality of the evidence (QoE)
supporting each bottom-line statement will
be rated by using a method based on the
Grading of Recommendations Assessment,
Development and Evaluation (GRADE)
approach for primary evidence (1 - very
low; 2 - low; 3 - moderate; 4 - high). This
method considers study design (meta-
analysis: yes or no) and AMSTAR rating of
the included systematic reviews.

Strategy of data synthesis: Synthesis of
reviews in terms of conclusions, quality of
evidence, and standard effectiveness

statements per our previous work (An umbrella review of systematic reviews of β -hydroxy- β -methyl butyrate supplementation in ageing and clinical practice: <https://onlinelibrary.wiley.com/doi/10.1002/jcsm.13030>).

Subgroup analysis: Supplementation with and without resistance training
Younger (18-50) vs. Older (>50)
Males vs. Females.

Sensitivity analysis: None planned.

Language restriction: English.

Country(ies) involved: Canada.

Keywords: N-3 fatty acid, Omega-3 fatty acid, Sarcopenia, Muscle.

Dissemination plans: Publication in a scientific journal.

Contributions of each author:

Author 1 - Everson Nunes - Conceived ideas for review, conducted searches, screened articles, conducted analysis, and drafted the paper.

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Author 2 - Alysha D'Souza - Conceived ideas for review, conducted searches, screened articles, conducted analysis and drafted the paper.

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Author 3 - Jeremy Steen - Conceived ideas for review, conducted searches, screened articles, conducted analysis and drafted the paper.

Author 4 - Stuart Phillips - Conceived ideas for review, conducted analysis and drafted the paper.

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Conflicts of interest: EAN reports receiving non-financial support from different companies (Laboratory Tiaraju (Santo Andre-RS, Brazil), Phytomare (Governador Celso Ramos-SC, Brazil) and Herbarium Laboratório Botânico Ltda (Colombo, PR, Brazil)) in the form of fish oil supplements to conduct clinical trials in clinical situations and pre-clinical research not directly related to the current review.