

Effects of nutritional counseling on physical performance and muscle strength in older adults: a systematic review protocol

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ABSTRACT

Objective: The objective of this review is to synthesize the effects of nutritional counseling compared with no intervention (maintaining lifestyle habits) or nutritional counseling in combination with other interventions (eg, nutritional supplementation, physical activity) on physical performance and muscle strength in older adults.

Introduction: Nutritional counseling, which is considered the first line of nutrition therapy, could play an important role in geriatric care programs by helping older adults understand the importance of nutrition and by promoting healthy, sustainable eating habits. However, the effects of nutritional counseling on physical function and muscle strength among older adults are not clear.

Inclusion criteria: This review will consider randomized controlled trials and non-randomized controlled trials. Participants aged 65 years or older, who have received nutritional counseling alone or in combination with another intervention (eg, nutritional supplementation, physical exercise) will be considered for inclusion. Comparators will include another intervention or no intervention, but physical performance (ie, gait, endurance, balance) or muscle strength must be measured.

Methods: This systematic review will be conducted in accordance with the JBI methodology for systematic reviews of effectiveness. The databases to be searched include MEDLINE (Ovid), Embase (Elsevier), CENTRAL (Ovid), CINAHL (EBSCO), and Scopus. Sources of unpublished studies and gray literature include Google Scholar and protocol registers. Two independent reviewers will select relevant studies, critically appraise the studies, and extract data. Studies will be pooled in a statistical meta-analysis or presented in narrative format. The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach will be used to grade the certainty of the evidence.

Review registration: PROSPERO CRD42022374527

Keywords: functional capacities; muscle strength; nutritional counseling; older adults; physical performance

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Introduction

Normal aging is accompanied by a decline in physical performance (ie, an objective measure of whole body function related to mobility¹) and a decrease in muscle strength.² Muscle strength decreases by 10% to 15% per decade up to the age

of 70 and this loss then accelerates by 25% to 40% per decade.³ This decline reduces the mobility of older adults, creating a vicious circle of deconditioning, which accelerates the spiral of loss of autonomy and increases the need for health care and services, and, therefore, health care costs.⁴ Furthermore, frailty, which is characterized by a reduction in physiological reserve and a reduced ability to respond to stress, is associated with a significantly increased risk of poor physical health.⁵

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To date, there is no pharmacological treatment to treat muscle wasting and physical performance decline.⁶ Further, the aging of the population has led to increased interest in the influence of lifestyle on muscle and physical function in older people, with the aim of identifying specific interventions to prevent and manage functional decline. In this sense, the evidence suggests that nutritional status is a factor that is strongly implicated in the aging process and, specifically, in the prevention of functional decline.⁷ However, there is moderate evidence that nutrition (including protein supplementation) and combined interventions are beneficial for frail older adults.⁸

Due mainly to the physiological and psychosocial changes that occur with aging, approximately 10% of older people suffer from malnutrition, and this percentage rises to 30% to 50% in nursing homes.⁹ In addition, almost 10% of physically frail older adults are malnourished.⁷ Disease-related malnutrition has adverse physiological and clinical consequences, reducing quality of life and delaying recovery from illness.¹⁰

Advice on improving nutritional intake through dietary counseling and/or oral nutritional supplements is often recommended for the management of malnourishment.¹¹ Meta-analyses support the use of oral nutritional supplements in the management of some malnourished individuals¹⁰; however, oral nutritional supplements are associated with significant costs to health care providers and poor compliance.¹² A potential alternative to oral nutritional supplements is nutritional counseling. This can be defined as a 2-way interaction between a patient and/or a group of patients and a member of the health care team through a nutritional assessment to identify any nutritional problems, needs, and goals.¹³ It can also be used for advice and support for individuals and groups on appropriate nutrition intake by integrating information from the nutritional assessment with information on foods and other sources of nutrients and meal preparation appropriate to cultural background and socioeconomic status.¹⁴ Nutritional counseling offers a greater variety of personalized strategies to help individuals achieve their health and wellness goals, lower health care costs, and can be tailored to individual needs.¹¹ However, nutritional counseling also has disadvantages. High dropout rates are a major challenge, potentially compromising expected outcomes.¹⁵ In addition, face-to-face nutritional counseling has a significant

impact on resource use in terms of clinical space, equipment, and time.¹³ Despite these drawbacks, nutrition counseling, which is considered the first line of nutritional therapy,¹⁶ could play an important role in geriatric care programs,¹⁷ helping older adults understand the importance of nutrition and promoting healthy, sustainable eating habits.¹⁸ In addition, nutritional counseling can prevent the onset of several aged-related health conditions or diseases.¹⁹ To prevent and manage malnutrition, the combination of nutritional counseling and oral supplementation is usually recommended,¹¹ although the effects of nutritional counseling on physical function and muscle strength in older adults is not clear. In addition, the randomized controlled trials conducted in this area are heterogeneous in terms of outcomes: 30-second chair stand test, 4-meter usual-pace walk test, muscle strength measures (ie, leg press [kg], dips [kg], pull-downs [kg], chair stand [number], step-ups [number], strength of thigh muscle isokinetic strength test). Interventions include trials (eg, nutritional counseling plus physical exercise²⁰; nutritional counseling plus oral nutritional supplement²¹; dietary counseling plus a nutrition plan²²; telephone counseling; and tailored printed materials aimed at increasing physical activity and improving overall diet²³); multidomain interventions (physical activity, nutritional counseling, and cognitive training); and omega-3 supplementation, combined or alone.²⁴ The duration of the interventions is also highly variable, for example, 12 months in the LEAD project²³; 36 months in the SPRINTT project.²⁰

Conducting a systematic review on this topic is justified for several reasons. Firstly, the decline in physical performance and muscle strength among older individuals is a common and concerning problem, and its prevalence is significant.^{1,2} It is crucial to gain a better understanding of effective interventions to prevent or mitigate this decline in the aging population in order to improve the quality of life and autonomy of older adults. Secondly, the existing studies on nutritional counseling show significant heterogeneity. As mentioned in the text, the literature in this field is rapidly growing, but studies vary greatly in terms of outcomes, interventions, duration, and other factors.^{20,21} A rigorous analysis and synthesis of all available studies is appropriate to provide a comprehensive overview of the effects of nutritional counseling on physical performance and muscle strength in older adults. Thirdly, there is a

need to clarify the effects of the intervention. Despite the potential benefits of nutritional counseling (eg, low cost), its actual effectiveness remains uncertain due to the diversity of studies. A well-conducted systematic review will allow us to critically evaluate the findings of different studies and provide robust scientific evidence on the effects of nutritional counseling on physical performance and muscle strength in older adults.

A preliminary search of PROSPERO, MEDLINE (Ovid), the Cochrane Database of Systematic Reviews (Ovid), and *JBIEvidence Synthesis* was conducted and did not identify any recent or in-progress systematic reviews on this topic. The findings of this systematic review will be valuable for clinicians, health care practitioners, and decision-makers in developing effective and evidence-based management strategies.

Review question

What is the effect of nutritional counseling on physical performance (ie, gait, endurance, and balance) or muscle strength in older adults?

Inclusion criteria

Participants

This review will consider all studies including adults aged 65 years or older (as defined by Medicare²⁵), with no limits on ethnicity, gender, or country of origin. Only participants living in the community who are independent in their activities of daily living (including eating) and who would benefit from nutritional advice will be considered. Where populations include adults under 65 years old, the study will be included if the median age of the participants is ≥ 65 years old (the mean age will be considered if the median isn't reported) or if the study findings are stratified into age categories.

Intervention

This review will consider all studies that evaluate the effects of nutritional counseling, regardless of the intervention conditions (such as the person who delivered the intervention or the mode of delivery, duration, or frequency of the intervention).

Comparators

The comparator is the combination of nutritional counseling with another intervention (eg, nutritional

supplementation, physical exercise) or no intervention (maintaining lifestyle habits). Note that multiple interventions can be used as a comparator and there are no restrictions on the intervention conditions.

Outcomes

This review will consider studies that include physical performance and/or muscle strength as outcomes that can be measured objectively at any time (ie, all durations of the intervention are considered and the outcomes can, therefore, be measured at different times from one study to another).

Physical performance encompasses the ability to perform activities that require physical actions, ranging from self-care (activities of daily living) to more complex activities that require a combination of skills, often with a social component or within a social context. Physical function is usually measured objectively using physical performance tests, therefore, the outcomes in this systematic review are gait, muscle endurance, or balance. With regard to gait, gait speed can be measured over different distances (4 meters, 6 meters) or during a defined time (eg, 6-minute walk test). Gait quality can also be assessed using different tools (eg, triaxial accelerometers) or tests. Muscle endurance is assessed by the chair stand test (ie, number of chair lifts). Balance (ie, time maintaining balance) can be measured using various validated tests (eg, SPPB test, Berg scale).

Muscle strength refers to the force that a muscle or a muscle group can produce at a specific velocity. Lower-limb and upper-limb muscle strength is considered for this study. The measures of muscle strength may differ from one study to another because of the tools used to measure it (eg, different types of dynamometer) or the outcomes (eg, mean strength, maximal strength, strength/body weight, absolute strength). All of these measures will be considered for this systematic review.

Types of studies

This review will consider randomized controlled trials and non-randomized controlled trials.

Methods

The proposed systematic review will be conducted according to the JBI methodology for systematic reviews of effectiveness.²⁶ The protocol has been registered in PROSPERO (CRD4202374527).

Search strategy

The search strategy will aim to locate both published and unpublished studies. An initial limited search of MEDLINE (Ovid), Embase (Elsevier), and CINAHL (EBSCO) was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles, were used to develop a full search strategy for MEDLINE (Ovid; see Appendix I). The search strategy was developed collaboratively (ND is an evidence search specialist) using an iterative process of testing potential search terms. The researchers jointly reviewed the results to determine the relevance and inclusion of the terms. The search strategy, including all identified keywords and index terms, was adapted for each included information source. The reference lists of all studies selected for critical appraisal will be screened for additional studies.

The databases to be searched include MEDLINE (Ovid), Embase (Elsevier), CENTRAL (Ovid), CINAHL (EBSCO), and Scopus. Google Scholar, ClinicalTrials.gov, and the WHO International Clinical Trials Registry Platform (ICTRP) will be searched for unpublished and gray literature related to the research questions.

Studies published in English or in French will be included as these are the languages the author team are proficient in. Studies published from database inception will be included.

Study selection

Following the search, all identified citations will be collated and uploaded into Covidence (Veritas Health Innovation, Melbourne, Australia) and duplicates removed. Following a pilot test, titles and abstracts will then be screened by 2 independent reviewers for assessment against the inclusion criteria for the review. Potentially relevant studies will be retrieved in full. The full text of selected citations will be assessed in detail against the inclusion criteria by 2 independent reviewers. Reasons for exclusion of full-text studies that do not meet the inclusion criteria will be recorded and reported in the systematic review. Any disagreements that arise between the reviewers at any stage of the study selection process will be resolved through discussion or with a third reviewer. The results of the search and the study selection process will be reported in the final systematic review and presented in a Preferred

Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) flow diagram.²⁷

Assessment of methodological quality

Eligible studies will be critically appraised by 2 independent reviewers at the study level for methodological quality using standardized critical appraisal instruments from JBI for randomized controlled trials and quasi-experimental studies.²⁸ Authors of studies will be contacted to request missing or additional data for clarification, if necessary. Disagreements between reviewers will be solved through discussion or with a third reviewer. The results of the critical appraisal will be reported in a table with an accompanying narrative.

All studies, regardless of their methodological quality score, will be subjected to data extraction and synthesis, where possible. The quality score of each study will be reported in the systematic review.

Data extraction

Data will be extracted from the studies included in the review by 2 independent reviewers using the standardized JBI data extraction tool.²⁹ The extracted data will include specific details about the populations (ie, characteristics of the interventional and control groups), study methods (ie, study design, statistical analysis), interventions (ie, duration, type of nutritional counseling), and outcomes relevant to the review question (ie, effectiveness results). A draft data extraction form is provided in Appendix II. A pilot phase on a representative sample of the studies will be carried out by 2 reviewers. Adjustments to the extraction table may be made, if necessary, at the end of this pilot phase. Disagreements between the reviewers will be solved through discussion or with a third reviewer. Authors of papers will be contacted to request missing or additional data, as necessary.

Data synthesis

Studies will, where possible, be pooled with statistical meta-analysis using R statistical software (R Foundation for Statistical Computing, Vienna, Austria). Effect sizes will be expressed as mean differences (for continuous data), and their 95% CI will be calculated for analysis. Statistical analyses will be performed using random effects, since heterogeneity is expected.³⁰ Heterogeneity will be estimated using the standard χ^2 and I^2 tests. Subgroup analyses will be conducted where there are sufficient data to

investigate the sex of the participants, their initial nutritional status, morbidities, as well as the intervention characteristics and outcome measures. Sensitivity analyses will be conducted to assess the impact of different criteria, such as heterogeneity, potential biases identified through study quality assessment, and statistical methods on the overall results.

Where statistical pooling is not possible, the findings will be presented in narrative format, including tables and figures, to aid in data presentation, where appropriate.

A funnel plot will be generated using R software to assess publication bias if there are 10 or more studies included in a meta-analysis. Statistical tests for funnel plot asymmetry (Egger test, Begg test, Harbord test) will be performed where appropriate.

Assessing certainty in the findings

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach to grading the certainty of evidence will be followed²⁹ and a Summary of Findings will be produced using GRADEpro GDT (McMaster University, ON, Canada). The Summary of Findings will present the following information: absolute risks; estimates of relative risk; and a ranking of the quality of the evidence based on the risk of bias, heterogeneity, and risk of publication bias of the review results. The outcomes reported in the Summary of Findings will be the effect of nutritional counseling on gait, endurance, balance, or muscle strength, as well as the added value of nutritional counseling alone compared with other interventions (eg, nutritional supplementation, physical activity).

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Author contributions

FB, OB, and ND designed the analysis. ND wrote the search strategy. FB and CB contributed to and collected data. FB and ND performed the analysis. FB wrote the manuscript. CB, ND, and OB reviewed the manuscript.

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Appendix I: Search strategy

Ovid MEDLINE(R) ALL <1946 to June 07, 2023 >

1. counseling/ (39,633)
2. directive counseling/ (2429)
3. Distance Counseling/ (77)
4. 1 or 2 or 3 (42,119)
5. Diet/ (185,455)
6. Diet, Healthy/ (6764)
7. “Food and Beverages”/ (0)
8. Food/ (38,331)
9. Beverages/ (16,980)
10. Feeding Behavior/ (92,504)
11. 5 or 6 or 7 or 8 or 9 or 10 (310,759)
12. 4 and 11 (1435)
13. ((diet* or nutrition* or food* or feed* or eat* or beverage* or drink*) adj3 (counsel* or advice* or advis* or recommend* or guid*)).ti,ab,kf. (43,055)
14. 12 or 13 (43,766)
15. aged/ (3,400,171)
16. “aged, 80 and over”/ or centenarians/ or nonagenarians/ or octogenarians/ (1,014,224)
17. Frail Elderly/ (14,971)
18. (((aged or old*) adj2 (people or adult* or person* or wom#n or m#n)) or elder* or centenarian* or nonagenarian* or octogenarian*).ti,ab,kf. (94,3327)
19. 15 or 16 or 17 or 18 (3,929,102)
20. physical functional performance/ (2658)
21. Motor Skills/ (26,393)
22. gait/ or gait analysis/ or walking speed/ (36,871)
23. Cardiorespiratory Fitness/ (3102)
24. Physical Fitness/ (29,722)
25. physical endurance/ or exercise tolerance/ (34,789)
26. Postural Balance/ (2,8021)
27. muscle strength/ or hand strength/ or pinch strength/ (44,494)
28. ((physical or motor) adj3 (perform* or abilit* or function* or skill* or capacit*)).ti,ab,kf. (148,525)
29. (functional adj3 (perform* or abilit* or skill* or capacit*)).ti,ab,kf. (54,141)
30. gait*.ti,ab,kf. (66,427)
31. walking.ti,ab,kf. (89,446)
32. ((Cardiorespiratory or physical) adj3 (fitness or stamina or exertion*)).ti,ab,kf. (23,948)
33. ((Cardiorespiratory or muscular or muscle* or physical) adj3 endurance).ti,ab,kf. (6588)
34. (exercise* adj3 (tolerance or endurance)).ti,ab,kf. (17,299)
35. (Postur* adj3 (balance* or equilibrium* or control*)).ti,ab,kf. (12,902)
36. (body adj3 (balance* or equilibrium*)).ti,ab,kf. (4559)
37. Musculoskeletal equilibrium*.ti,ab,kf. (9)
38. ((musc* or hand* or grip* or grasp* or pinch*) adj3 strength).ti,ab,kf. (56,572)
39. 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 (483,985)
40. 14 and 19 and 39 (549)

Appendix II: Draft data extraction form

Name of the reviewer	
Article information	ID of the reference
	First author's name
	Correspondence
	Journal
	Year of publication
	Title
	Country
	Objective of the study
Study design	Study design
	Study duration (baseline to last follow-up for functional capacities outcomes)
	Intervention
	Comparator
Population characteristics	General description of the population
	Inclusion criteria
	Exclusion criteria
	Sample analyzed in ITT or PP
	Gender distribution
	Age (years)
Intervention characteristics	Why?
	What?
	Who provided?
	How?
	Where?
	When and how much?
	Tailoring
	Modifications
	How well?
Outcomes: functional capacities	Outcome (eg, Tinetti, TUG, grip strength)
	Statistical method if raw results are not reported (when adjusted: specify adjustment variables)
	Baseline (mean ± SD)
	End of follow-up (mean ± SD)

<i>(Continued)</i>	
Name of the reviewer	
	Difference between baseline and follow-up (mean ± SD)
	Baseline (only if not reported in mean ± SD; specify type)
	End of follow-up (only if not reported in mean ± SD; specify type)
	Difference between baseline and follow-up (only if not reported in mean ± SD; specify type)
Quality of the study	
Conclusions	
Funding (0 = no; NR = not reported; if yes, describe funding)	
Conflict of interest (1 = yes; 0 = no; NR = not reported)	
Commentary	

ITT, intention to treat; PP, per protocol; TUG, timed up and go.