




BMJ Open Non-pharmacological interventions for possible sarcopenia or sarcopenia in community-dwelling older adults: a scoping review protocol

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ABSTRACT

Introduction Early prevention of sarcopenia is a recommendation to reduce morbidity, mortality and improve quality of life. Several non-pharmacological interventions to reduce the risk of sarcopenia in community-dwelling older people have been proposed. Therefore, there is a need to identify the scope and differences of these interventions. This scoping review will summarise the nature and extent of the existing literature that describes and examines non-pharmacological interventions for community-dwelling older adults with possible sarcopenia or sarcopenia.

Methods and analysis The seven-stage review methodology framework will be used. Searches will be conducted in the following databases: Embase, Medline, PsycINFO, CINAHL, All EBM Reviews, Web of Science, Scopus, CBM, CNKI, WANFANG and VIP. Grey literature will also be identified from Google scholar. Search dates will be restricted to January 2010 to December 2022, in English and Chinese language only. Screening will be focused on published research, including both quantitative and qualitative study designs, and prospectively registered trials. Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews will be followed when delineating the search decision process. Findings will be synthesised quantitatively and qualitatively as appropriate and classified using key conceptual categories. We will identify whether studies identified have been included in systematic reviews or meta-analyses, and research gaps and opportunities will be identified and summarised.

Ethics and dissemination As this is a review, ethical approval will not be sought. The results will be published in peer-reviewed scientific journals and also disseminated in relevant disease support groups and conferences. The planned scoping review will help us identify the current status of research and gaps in the literature, so as to develop a future research agenda.

BACKGROUND

According to the latest international consensus statement, sarcopenia is a muscle disease or muscle failure rooted in adverse muscle changes that accrue across a lifetime, which can be divided into three categories:

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This scoping review will contribute to the identification of non-pharmacological interventions for possible sarcopenia or sarcopenia in community-dwelling older adults.
- ⇒ This is a review-based approach to mapping quantitative and qualitative literature on a complex and broad topic.
- ⇒ The inclusion of grey literature helps to reduce publication bias.
- ⇒ As this is a scoping review, the quality of individual studies will not be assessed.
- ⇒ This review focuses on studies written in the English and Chinese languages, and may miss relevant literature published in other languages.

possible/probable; confirmed or severe sarcopenia.^{1 2} The Asian Working Group for Sarcopenia (AWGS) 2019² defines possible sarcopenia as ‘low muscle strength with or without reduced physical performance’. In a 2018 definition put forward by the European Working Group on Sarcopenia in Older People (EWGSOP2) low muscle strength is also used as the primary indicator of probable sarcopenia.¹ According to both AWGS 2019² and EWGSOP2,¹ confirmed sarcopenia is indicated by the presence of low muscle quantity or quality; however, severe sarcopenia should be considered if low physical performance is also confirmed.

Sarcopenia is a relatively common muscle disease, the prevalence of which varies widely according to country, region, age, gender and comorbid disease. A recent systematic review and meta-analysis demonstrates that the global prevalence of sarcopenia varies between 10% and 27%, with the highest prevalence in Oceania and the lowest in Europe.³ A study using a predictive model estimated the number of sarcopenia patients will dramatically rise in Europe from

10,869,527–19,740,527 in 2016 to 18,735,173–32,338,990 in 2045 (72.4% and 63.8% increases, respectively).⁴ In addition, with regard to regional and age-related variations, another review reported the prevalence of sarcopenia to be 1%–29% in community-dwelling populations, 14%–33% in long-term care populations and 10% in acute hospital-care populations although this latter finding is based on only one study.⁵ Moreover, Pagotto and Silveira⁶ found prevalence determined by dual-X-ray absorptiometry, differs by gender; ranging from 2.2% to 95% in males and from 0.1% to 33.9% in females. As a comorbid disease, the prevalence of sarcopenia in individuals with cardiovascular disease, dementia, diabetes mellitus and respiratory diseases is 31.4%, 26.4%, 31.1% and 26.8%, respectively.⁷

If left untreated, sarcopenia may result in high personal, social and economic burden, and as such, optimal care is essential.⁸ For the individual, sarcopenia is associated with increased risk of falls and fractures;^{9–10} reduced ability to perform daily activities;¹¹ increased risk of mobility disorders¹² and contributes to lower quality of life,¹³ loss of independence or the need for long-term care placement^{14–16} and even death.¹⁷ In financial terms, sarcopenia is costly to healthcare systems. Among older adults who are hospitalised, those with sarcopenia on admission tend to have higher hospital costs (more than five times the cost) than those without sarcopenia.¹⁸ Results of a large-scale, community-based study in the Czech Republic showed that direct healthcare costs were more than twice as high for older people with sarcopenia than for those without.¹⁹

Hence, over recent years, attention has been increasingly paid to the prevention, detection and treatment of sarcopenia around the world. For instance, possible sarcopenia, as described by both the EWGSOP2 and the AWGS, is a relatively new category of sarcopenia that may be useful in primary healthcare and preventive services by raising awareness of sarcopenia prevention.^{1–2} Possible sarcopenia is increasingly becoming the focus of research aiming to design intervention strategies to prevent the development of sarcopenia in the community.^{20–22} However, to date, there has not been a comprehensive systematic review of these intervention approaches.

With regard to intervention types, there are already a number of studies on the development of pharmacological and non-pharmacological strategies for sarcopenia. A recent review described pharmacological interventions for treating sarcopenia,²³ but to date, there remains no US Food and Drug Administration (FDA) approved drugs for the treatment of sarcopenia. Regarding non-pharmacological interventions for sarcopenia, interventions are diverse and lack comprehensive description and comparison. For example, there are numerous modalities of physical activity described in the literature^{24–28} and different types of exercise can affect varying, but specific, responses in muscle function.²⁹ However, there are discrepancies in the selection and combination of exercise modes, exercise intensity, total repetitions, rest periods, training dose, regularity and progression

across studies. As for dietary modification, overall food intake^{24–30–33} and dietary pattern changes^{34–36} have been areas of focus in muscle health and sarcopenia prevention in recent years. But there still appears to be a lack of holistic understanding about the types, characteristics and intervention effectiveness among different foods or dietary patterns. In addition, only a few studies incorporated health education as an intervention and tested its effects.^{37–39} Components of health education that may be important in sarcopenia, such as causes, risk factors, preventive measures and treatments, are missing in these studies.^{26–38–40–42} Furthermore, studies have shown that sarcopenia is associated with depressive mood^{43–46} and bipolar disorder,⁴⁷ but there do not appear to be any interventions specifically targeting mental health in community-dwelling population with sarcopenia.

Although several reviews on non-pharmacological interventions for sarcopenia already exist,^{16–48–49} they only focus on physical activity and/or nutritional interventions, without age or healthcare setting restrictions and do not include health education or emotional support, or target possible sarcopenia. It is currently unknown whether there are differences among non-pharmacological interventions for possible, confirmed and severe sarcopenia. Therefore, it is important to conduct a scoping review on non-pharmacological interventions for possible sarcopenia or sarcopenia in community-dwelling older adults to identify existing literature and gain a clearer picture of the current evidence.⁵⁰ This will help determine whether a systematic review and meta-analysis is possible, and if not, to identify the areas in which the current literature is deficient. A scoping review rather than a systematic review and meta-analysis is appropriate, as our initial aim is to identify the characteristics of interventions conducted.⁵¹ If the identified literature has excessive heterogeneity in terms of interventions and outcomes, a future systematic review and meta-analysis will not be possible.

Scoping review objectives

The purpose of this scoping review is to identify and explore the evidence describing and examining non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community settings. We will explore differences among non-pharmacological interventions for possible, confirmed and severe sarcopenia and assess the heterogeneity of interventions and outcome measures used. We will investigate whether each intervention has been included in previous systematic reviews or meta-analyses to decide whether it is necessary to conduct a systematic review or an overview of systematic reviews on this topic in the next research stage. Our findings will help identify research gaps and limitations in the existing literature.

METHODS

This protocol was developed using the seven stages of scoping review methodology framework which was originally proposed by Arksey and O'Malley⁵⁰ and then

enhanced by Levac *et al.*⁵² and Daudt *et al.*⁵³ This comprises: (1) identification of research questions, (2) identification of relevant studies, (3) selection of relevant studies, (4) extracting and charting data, (5) collating, summarising and reporting results, (6) consultation, and (7) transferring knowledge.

The scoping review will be reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist (PRISMA-ScR).⁵⁴

Stage 1: identifying research questions

This scoping review will answer the following questions:

- ▶ What types of study exist in terms of non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community settings?
- ▶ What are the differences in types, durations, frequencies, timings and outcomes of non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community settings?
- ▶ What are the challenges and barriers in preventing sarcopenia using non-pharmacological interventions with older adults in community setting?
- ▶ Does the observed degree of heterogeneity of interventions and outcome measures support moving to a full systematic review?

Stage 2: identifying relevant studies

The team planned the search strategy in consultation with a professional librarian to identify a comprehensive list of relevant literature specific to non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community settings. The electronic search for literature will focus on retrieving published articles in peer-reviewed scientific journals and prospectively registered trials by a systematic search of the following databases: Embase, Medline, Psychological Information (PsycINFO), Cumulative Index to Nursing and Allied Health Literature (CINAHL), All Evidence Based Medicine Reviews (All EBM Reviews), Web of Science, Scopus, Chinese Biomedical Literature Database (CBM), Chinese National Knowledge Infrastructure (CNKI), Wan Fang Database (WANFANG), Chinese Science and Technology Periodical Database (VIP). Grey literature will be identified from Google scholar. Searches will be restricted in date from January 2010 to December 2022, and to English and Chinese languages only.

Two researchers will independently perform the literature search and eligibility assessments. If there are any disagreements, these will be resolved by a third member of the research team. In addition, a manual search of reference lists of included literature will be performed. We will use search terms related to non-pharmacological interventions (eg, intervention, treatment or therapy) in older adults with possible sarcopenia or sarcopenia, with various combinations in each electronic database while using controlled vocabulary with the Boolean operators

AND and OR. To ensure all types of non-pharmacological interventions will be captured by the search, we will not restrict the search terms for intervention methods like nutrition or exercise. However, the initial number of search results for only restricting the search by disease, population and intervention were extremely large. Therefore, we decided to exclude studies whose titles contain clearly irrelevant terms regarding sarcopenia interventions (eg, incidence, pathology and diagnosis). Filters will be applied to ensure that only records with human participants are returned by the search. A draft of the search strategy in MEDLINE is shown in online supplemental table S1. A copy of the search strategies and preliminary search results in each electronic database will be saved.

Stage 3: selecting relevant studies

The selection of relevant studies will follow two stages of screening. First, the selected studies will be integrated into Endnote software to eliminate duplicates and then will be transferred to Rayyan software,⁵⁵ to conduct the screening. The initial screening of titles, abstracts and keywords will be undertaken independently by two reviewers to assess the relevance of each study. These two reviewers will discuss the results once screening is completed. Any disagreements will be discussed by the two reviewers, and if consensus cannot be reached, a third member of the research team will be consulted. Then, full-text review will be undertaken. Two reviewers will independently assess the articles to determine whether they meet the inclusion criteria. Disagreements regarding inclusion will be discussed and resolved by consensus with a third member of the research team.

Table 1 describes the inclusion and exclusion criteria for study selection according to three categories: Population, Concept/Focus and Context.⁵⁶ We will include studies that focus on: (1) individuals 60 years of age or older (or where the average age of the study sample is 60 years of age or older), who have possible sarcopenia or sarcopenia diagnosis; (2a) describe or report the types, durations, frequencies or timings of non-pharmacological interventions for preventing sarcopenia; (2b) evaluate the effectiveness of different non-pharmacological interventions for preventing sarcopenia, and the characteristics and contexts contributing to positive outcomes or experiences; (2c) report the challenges and barriers of preventing sarcopenia using non-pharmacological interventions within older adults and (3) studies conducted in community settings. Research articles using quantitative or qualitative methods, as well as reviews, will be included.

A Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram will be used to delineate the search process,⁵⁴ which will include search results, removal of duplicate citations, study selection, full retrieval and additions from reference list searching and final selection for inclusion.

It should be emphasised that in previous literature, nutritional regulation was one of the most common interventions for sarcopenia, and contained both

Table 1 Inclusion and exclusion criteria

Category	Inclusion criteria	Exclusion criteria
Population	Older individuals ≥ 60 years old (or where the average age of the study sample is 60 years of age or older), who have possible sarcopenia or sarcopenia diagnosis.	<ol style="list-style-type: none"> 1. Studies on non-pharmacological interventions of adults with possible sarcopenia or sarcopenia under 60 years or where those aged 60 years or older are not reported separately in a way that would permit subanalysis. 2. Studies on sarcopenia concomitant with another disease (eg, cancer, cachexia, obesity, neurologic disease).
Concept or focus	<ol style="list-style-type: none"> 1. Studies describing or reporting the types, durations, frequencies or timings of non-pharmacological interventions (exercises, dietary modification, health education, etc.) in the treatment and care of older adults with possible sarcopenia or sarcopenia, before, during or after treatment (medication and/or therapy requiring hospitalisation) including follow-up care. 2. Studies evaluating the effectiveness of different non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia, and the characteristics and contexts contributing to positive outcomes or experiences. 3. Studies reporting the challenges and barriers of non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia. 	<ol style="list-style-type: none"> 1. Studies validating electronic versions of scales or questionnaire forms of existing instruments or electronic patient records. 2. Studies reporting costs of non-pharmacological interventions only.
Context	Studies conducted in community settings (including residential care homes/assisted living).	Studies conducted in hospitals.
Others	English and Chinese language Original articles or review research articles Qualitative (eg, qualitative descriptive, phenomenological, ethnographical, grounded theory, realistic evaluation, action research), quantitative (eg, randomised controlled trials, cohort study, case-control, quasi-experimental study) or reviews (eg, systematic review, meta-analysis, scoping review, narrative review) or descriptions of study protocols.	Editorials Opinion/perspective papers Conference abstracts Case reports

pharmacological and non-pharmacological elements. According to the food synergy concept which is helpful to distinguish between a food and a drug, many supplements derived from food are isolated substances and could be classified as drugs, and foods enriched with an isolated substance can be seen as drugs delivered via a foodstuff.⁵⁷ Therefore, to make this scoping review more rigorous, if a dietary supplement is for ‘the prevention, cure, mitigation and therapeutic treatment of disease’ and exceeds a certain level of intake as regulated for and approved by the FDA, it will be classified as pharmaceutical and excluded, including specific nutrients (eg, vitamins, minerals, amino acids aliphatic acids) and/or phytochemicals (eg, carotenoids, ursolic acid and tomatidine).

Stage 4: extracting and recording data

A standardised form developed by our research team will be used to extract data from the articles that meet the inclusion criteria. All relevant data will be included to answer the scoping review questions. The basic content to be recorded will include: description of study characteristics (eg, authors, type of study design, publication year, country, the geographical location in which the research was conducted, aims/purpose, methodology and sample size), description of study populations including PROGRESS-Plus criteria⁵⁸ (eg, age, gender/sex, residence, ethnicity, cultural background, cognition and comorbidity), description of non-pharmacological interventions and control conditions (eg, type of intervention, duration, frequency and timing), effectiveness (eg, process, impact and outcome), the challenges and barriers. The form will be piloted by two reviewers on three studies before formal use.

Two reviewers will extract and record the data independently and any discrepancies will be resolved through

discussion and consensus with a third member of the research team. As the aim of a scoping review is to identify and describe the evidence, the quality of individual studies will not be assessed.

Stage 5: collating, summarising and reporting results

First, the extracted data will be summarised using descriptive statistics, which will be reported in tables and/or in narrative form. Second, in accordance with recommendations,⁵⁹ a method of parallel-results convergent synthesis design will be used to synthesise quantitative and qualitative data, where both types of evidence will be analysed and presented separately, with integration occurring during the interpretation of results. The strength of this method is to provide a synthesis strategy which addresses complementary review questions pertaining to the broad topic of non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community setting.

For quantitative data, descriptive statistics will be used to describe the data and where appropriate, thematic synthesis will also be used to contextualise the findings. For qualitative data, narrative synthesis and thematic synthesis of the findings will be conducted depending on research questions. A thematic synthesis, comprising identification of major themes, will be conducted across included studies. Finally, research gaps and opportunities will be identified and summarised. The review results may be presented as a ‘numerical summary’, ‘narrative summary’, ‘table’, ‘conceptual map’ and/or ‘schematic representation’ of the data. Additional presentation formats will be decided after data extraction, so as to make sure the results are clear and visually compelling to readers.

Stage 6: consultation

A stakeholder group will be convened, comprising of (1) older adults with possible sarcopenia or sarcopenia, and (2) community healthcare staff, occupational physicians and researchers in the field of sarcopenia. The stakeholder consultation workshops will permit each participant to bring their unique expertise that will enrich the analytic perspective. Convenience sampling will be used to select relevant stakeholders. We aim to hold two workshops with 3–5 participants per workshop. The purpose of the consultation is to verify the applicability of the results and validity of the contents of the scoping review, so as to provide important insights for planning the next stage of research.

Stage 7: transferring knowledge

New knowledge related to non-pharmacological interventions for older adults with possible sarcopenia or sarcopenia in community settings will be generated from this study. This may be important and useful to various stakeholders, including patients, caregivers, medical professionals and researchers. An online group made up of possible sarcopenia or sarcopenia patients and their caregivers will be formed and the main results will be shared with them in plain language, to identify how best to present results to lay audiences. A second online group made up of medical professionals and researchers working in the field of sarcopenia will be assembled. Study results will be shared with them to identify how best to inform clinical practice and research.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct of this research, but will be involved as stakeholders (as explained above).

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