

Effects of different exercise interventions on older adults with Sarcopenic Obesity: a systematic review and network meta-analysis

INPLASY202520021

doi: 10.37766/inplasy2025.2.0021

Received: 5 February 2025

Published: 5 February 2025

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ADMINISTRATIVE INFORMATION**Support** - Shandong Social Science Planning Fund Program(Project No.23CSHJ13).**Review Stage at time of this submission** - Data analysis.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202520021**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 5 February 2025 and was last updated on 5 February 2025.**INTRODUCTION**

Review question / Objective With the growing global aging population, sarcopenic obesity (SO) has become an important public health issue affecting the health of the elderly. Sarcopenic obesity refers to the coexistence of sarcopenia and excess body fat.

To fill the gap in existing research, this study employs network meta-analysis (NMA) and dose-response meta-analysis to systematically evaluate the effects of different exercise interventions on body composition, physical function, and physiological-biochemical indicators in patients with sarcopenic obesity (SO). It also aims to explore the relationship between exercise dosage and effect size. The specific objectives are as follows:

1.To investigate the relationship between different exercise modes and multiple outcome measures in SO patients.

2.To identify the most effective exercise intervention mode for improving physical outcomes in SO patients.

3.To examine the dose-response relationship between exercise dosage and physical outcomes in SO patients.

Condition being studied The prevalence of sarcopenic obesity is estimated to range from 2.75% to over 20% based on different definitional criteria (Dowling, L. et al., 2022). A recent meta-analysis indicated that the overall prevalence of sarcopenic obesity among non-hospitalized older adults is 14%, with 12.6% in men and as high as 33.5% in women. It is projected that by 2051, 1 to 2 billion people worldwide will be affected by sarcopenic obesity (Luo, Y. et al., 2024).

Compared to individuals with simple obesity or isolated muscle loss, those with sarcopenic obesity face higher health risks, including metabolic disorders, cardiovascular diseases (such as atherosclerosis, hypertension, and heart failure),

as well as an increased risk of falls and fractures (Mirzai, S. et al., 2024). Furthermore, studies have shown that sarcopenic obesity is a significant prognostic factor for certain types of cancer, associated with poorer postoperative outcomes and overall survival rates (Liu, C. et al., 2023). This complex pathophysiological condition involves alterations in metabolism, endocrinology, inflammation, and neuromuscular function, leading to a decline in muscle mass and the accumulation of visceral fat, which exacerbates systemic inflammation and oxidative stress, ultimately posing a severe threat to the overall health of patients.

This study relies on the extensive digital resources of the library at Shandong University and the expertise of its experienced researchers to conduct a network meta-analysis of the disease.

METHODS

Search strategy We conducted a search across six databases, including CINAHL (Cumulative Index to Nursing and Allied Health Literature), Ovid, PubMed, Embase, Web of Science, and the Cochrane Central Register of Controlled Trials, and used Google Scholar to identify grey literature.

Participant or population Older adults with a definite diagnosis of muscle-reducing obesity were included and reported complete outcomes.

Intervention Various aerobic and resistance or combined exercises or other exercises.

Comparator The review compares two or more exercise intervention strategies, including aerobic exercise, resistance exercise, combined training (a combination of aerobic and resistance exercise), synchronous training, circuit training, or other types of exercise, as well as integrated training programs that combine various forms of exercise, or compares the exercise intervention group with a control group (e.g., no treatment, standard care, telephone follow-up, regular education, etc.).

Study designs to be included Randomized Controlled Trial (RCT).

Eligibility criteria (1) The study population includes older adults, with all participants diagnosed with sarcopenic obesity based on clear diagnostic criteria. The presence of this condition is determined by the authors according to their respective diagnostic indicators. (2) The review compares two or more exercise intervention strategies, including aerobic exercise, resistance exercise, combined training (a combination of

aerobic and resistance exercise), synchronous training, circuit training, or other types of exercise, as well as integrated training programs that combine various forms of exercise, or compares the exercise intervention group with a control group (e.g., no treatment, standard care, telephone follow-up, regular education, etc.). (3) Studies exploring combined exercise and dietary interventions, or those lacking outcome measures, with unclear diagnoses, or published in languages other than English, will be excluded.

Information sources We conducted a search across six databases, including CINAHL (Cumulative Index to Nursing and Allied Health Literature), Ovid, PubMed, Embase, Web of Science, and the Cochrane Central Register of Controlled Trials, and used Google Scholar to identify grey literature.

Main outcome(s) The outcome measures include: Body Fat Percentage, Grip Strength, Walking Speed, Triglyceride Levels, Systolic Blood Pressure, Diastolic Blood Pressure, Lean Body Mass, Total Fat Mass, High-Sensitivity C-Reactive Protein (hs-CRP).

Additional outcome(s) Psychological measures, such as anxiety, may also be included.

Quality assessment / Risk of bias analysis Two researchers independently assessed the risk of bias (ROB) using the Cochrane Handbook version 5.1.0 tools.

Strategy of data synthesis Analysis will be conducted using the Cochrane Collaboration's RevMan 5.4.1 software to assess the effects of exercise training on body composition, physical performance, and physiological and biochemical indicators. Network meta-analysis will be performed using the network and netmeta packages in Stata 15.1. The mean difference (MD) will be used to evaluate the effect size, and 95% confidence intervals will be calculated. The relationship between metabolic equivalent of task (MET-min/wk) and health outcomes will be explored. Dose-response analysis will be conducted using R software.

Subgroup analysis Subgroup analysis will be considered based on the dose of exercise.

Sensitivity analysis Sensitivity analysis for the traditional meta-analysis will be conducted using Stata version 18.0. The impact of removing a single study on the effect size will be explored to investigate the sources of heterogeneity. Sensitivity

analysis for the traditional meta-analysis will be conducted using Stata version 18.0.

Country(ies) involved China.

Keywords Sarcopenic Obesity; Exercise Intervention; Systematic Review; Network Meta-Analysis.

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