INPLASY

Effect of Exercises Based on ACSM Recommendations in Patients with Preserved Ejection Fraction: A Systematic Review and Meta-Analysis of Randomized Controlled Trial

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ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 March 2026 and was last updated on 19 March 2026.

INTRODUCTION

Review question / Objective This study aimed to evaluate the effects of exercise training following the American College of Sports Medicine (ACSM) guidelines on exercise capacity, quality of life, and left ventricular function in patients with heart failure with preserved ejection fraction (HFpEF).
(P) population: patients with preserved ejection fraction; (I) intervention: exercises; (C) control group: no exercise or usual care grope; (O) outcomes:6-MWT,peakVO2,MLWHF total score, LVEF, E/e' ratio, E/A ratio, VE/VCO2 slope and DT； (S) study type: randomized controlled trial.

Condition being studied Heart failure represents the severe manifestation or end-stage of various cardiac diseases. The prevalence of heart failure among adults in developed countries ranges from 1.0% to 2.0% , and it is continuously increasing. Moreover, mortality and rehospitalization rates remain high, and heart failure leads to a decline in patients' quality of life. Consequently, heart failure is recognized as a growing public health burden.Heart failure with preserved ejection fraction (HFpEF) accounts for more than 50% of heart failure cases in patients aged 65 and older. The morbidity and mortality rates of HFpEF are comparable to those of heart failure with reduced ejection fraction (HFrEF) . A hallmark feature of HFpEF is exercise intolerance, characterized by severe exertional dyspnea and fatigue.In contrast to the numerous guideline-recommended pharmacological and non-pharmacological treatment options available for HFrEF, effective therapies for improving clinical outcomes in HFpEF have been limited. To date, only the sodium-glucose cotransporter 2 inhibitor empagliflozin, the glucagon-like peptide-1 receptor agonist semaglutide, and the non-steroidal mineralocorticoid receptor antagonist finerenone have demonstrated improvements in clinical outcomes for HFpEF patients. Within this context, non-pharmacological interventions have become a key direction for improving the functional status of HFpEF patients. Among these, exercise intervention has garnered widespread attention

due to its low cost, high safety profile, and multifaceted benefits.

METHODS

Search strategy Four databases (PubMed, EMBASE, Web of Science, and Cochrane Library) were searched from their inception to November 2025.

Participant or population Study participants were adult patients with HFpEF, with LVEF ≥ 45%.

Intervention The intervention for the experimental group was exercise, including aerobic or endurance exercise, resistance training, high-intensity interval training (HIIT), flexibility training, or a combination of the above.

Comparator The control group received no treatment or received treatment unrelated to exercise.

Study designs to be included Published RCTs.

Eligibility criteria All participants did not receive specific pharmacotherapy;(f) The outcome measures in the study included one or more of the following: 6-MWT,peakVO2,MLWHF total score, LVEF, E/e' ratio, E/A ratio, VE/VCO2 slope and DT.

Information sources Four databases (PubMed, EMBASE, Web of Science, and Cochrane Library) were searched from their inception to November 2025.

Main outcome(s) 6-MWT,peakVO2,MLWHF total score, LVEF, E/e' ratio, E/A ratio, VE/VCO2 slope and DT.

Data management Two authors (J.S. and R.S.) independently performed the literature screening and data extraction. After initial title/abstract screening, potentially eligible studies underwent full-text review. Any disagreements were resolved by consensus with a third author (H.G.). There were no restrictions on age, gender, publication date, or language.
Data on study characteristics, participants, exercise interventions, and outcomes (e.g., 6MWT, peak VO_2, MLHFQ score, E/e' ratio) were extracted into a predefined spreadsheet.

Quality assessment / Risk of bias analysis Two researchers(J.H. and G.X.) assessed the risk of bias independently. Since the included studies were divided into randomized controlled trials (RCTs) and cohort studies, different tools were used to assess the risk of bias.RCTs were evaluated according to the RCT risk of bias assessment tool of the Cochrane Handbook version 5.1.0. The following seven aspects were considered: (1) random sequence generation (selection bias), (2) allocation concealment (selection bias), (3) blinding of participants and personnel (performance bias), (4) blinding of outcome assessment (detection bias), (5) incomplete outcome data (attrition bias), (6) selective reporting (reporting bias), and (7) other sources of bias. Trials were categorized into three levels of risk of bias by the number of components for which high risk of bias potentially existed: high risk (five or more), moderate risk (three or four), and low risk (two or less)[27].

Strategy of data synthesis RevMan 5.4 software was used for meta-analysis. The extent to which the outcomes of the included studies were consistent was assessed. If I2 is 50%, the heterogeneity is considered to be high. If high heterogeneity between studies was found, a random-effects (RE) model was used. Otherwise, a fixed-effects (FE) model was used. Heterogeneity across studies was further investigated by performing sensitivity analyses. A p-value<0.05 was considered to be associated with the occurrence of the outcome.

Subgroup analysis Two other authors (X.G. and J.H.) independently evaluated the exercise intervention dose in each study for adherence to ACSM recommendations for HFpEF. Each exercise parameter (frequency, intensity, etc.) was scored (2=meets standard, 1=uncertain, 0=does not meet). Discrepancies were resolved by a third author(F.L.). The overall adherence proportion was calculated. Studies with ≥70% adherence were classified as "high adherence"; those with <70% were "low/uncertain adherence."

Sensitivity analysis Through sensitivity analysis by eliminating one by one, we found that no single literature had a significant impact on the overall results, and thus we believe the results are stable.

Language restriction No.

Country(ies) involved China.

Other relevant information No.

Keywords Heart failure with preserved ejection fraction, American College of Sports Medicine, Exercise training, Athletic ability, Quality of life, Cardiac function, Meta-analysis.

Contributions of each author

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