INPLASY PROTOCOL

To cite: Zhang et al. Effect of exercise training for patients with atrial fibrillation after radiofrequency ablation on exercise endurance and cardiac function: a systematic review and meta-analysis. Inplasy protocol 202250122. doi: 10.37766/inplasy2022.5.0122

Received: 19 May 2022

Published: 19 May 2022

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Support: **Shanghai Medical Program.**

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

Conflicts of interest:
None declared.

Effect of exercise training for patients with atrial fibrillation after radiofrequency ablation on exercise endurance and cardiac function: a systematic review and meta-analysis

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Review question / Objective: **P:adult patients 18 years of age or older who suffered from AF and received radiofrequency ablation; I:a structured exercise program, including aerobic, resistance exercise training, combined exercise (aerobic and resistance), functional electrical stimulation, and inspiratory muscle training; C:routine care; O:6-minute walking distance (6MWD), peak oxygen uptake (peak VO2), resting heart rate, left ventricular ejection fraction (LVEF), and quality of life; S: randomized controlled trials (RCTs).**
Condition being studied: **Atrial fibrillation (AF) is the most common arrhythmia, and its incidence and fatality rate increase year by year with age.The current treatments for AF include drug therapy and surgical treatment [radiofrequency ablation (RFA), left atrial appendage occlusion (LAAO)] RFA has become the first choice for treating AF due to its minor trauma and fast postoperative recovery.5 However, there is a recurrence rate of about 30% after catheter ablation. Postoperative intervention is still required to improve the structure and function of the heart. Studies have confirmed that exercise training plays a vital role in the improvement of coronary heart disease, heart failure, and myocardial infarction, but there are few literatures reporting on AF patients after RFA; there is also no systematic study to clarify its role in the management of AF.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 19 May 2022 and was last updated on 19 May 2022 (registration number INPLASY202250122).

INTRODUCTION

Review question / Objective: **P:adult patients 18 years of age or older who suffered from AF and received radiofrequency ablation; I:a structured exercise program, including aerobic, resistance exercise training, combined**

exercise (aerobic and resistance), functional electrical stimulation, and inspiratory muscle training; C:routine care; O:6-minute walking distance (6MWD), peak oxygen uptake (peak VO2), resting heart rate, left ventricular ejection fraction (LVEF), and quality of life; S: randomized controlled trials (RCTs).

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METHODS

Participant or population: Adult patients 18 years of age or older who suffered from AF and received radiofrequency ablation.

Intervention: A structured exercise program, including aerobic, resistance exercise training, combined exercise (aerobic and resistance), functional electrical stimulation, and inspiratory muscle training.

Comparator: Routine care.

Study designs to be included: Randomized controlled trials (RCTs) related to exercise intervention in patients with AF were searched in Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, Web of Science, CINAHL EBSCO, Scopus, SinoMed, China Knowledge Network, Wanfang, and Weipu databases. The retrieval period was from January 2010 to July 2021. The included literature was strictly evaluated, and data were extracted. The related indexes were analyzed by meta with RevMan 5.3 software.

Eligibility criteria: A study was excluded if it met any of the following criteria: (1) the full text was not available; (2) relevant outcomes were not mentioned or unclearly expressed; (3) repeated publications; (4) animal studies, case reports, comments, abstracts, meeting minutes and editorials.

Information sources: The databases include Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, Web of Science, CINAHL EBSCO, Scopus, SinoMed, China Knowledge Network, and Wanfang, and Weipu were searched for published studies in Chinese and English. The search period was from January 2010 to July 2021. The Chinese search keywords included "atrial fibrillation," "exercise," "aerobic exercise," "resistance training," "exercise training," "exercise rehabilitation," and "activity." The English search keywords were "atrial fibrillation," "aerobic exercise," "exercise rehabilitation," "training/ exercise," and "randomized controlled trial." In addition, system review, meta-analysis, and reference list were manually searched using the literature review method for relevant literature as a supplement.

Main outcome(s): A total of 904 articles were retrieved. After removing 185 duplicate articles by NoteExpress software, 10 RCTs were finally included, including 8 in English,and 2 in Chinese.Among the included literature, one study was grade A, and the rest were grade B, with overall quality of moderate. Eight studies, described randomization methods; 4 studies described random allocation concealment; 3 studies mentioned blinding methods, but only one involved blinding of participants, personnel and assessment; 1 study had data loss. During the follow-up period, 26 patients in the experimental group and 27 in the control group withdrew from the study. The results showed that 6MWD of the experimental group was

significantly better than that of the control group(MD=34.42, 95%CI: 3.20 to 65.63, P=0.03).The peak VO2 of the experimental group was significantly better than that of the control group, and the difference was statistically significant (SMD=1.96, 95% CI: 1.14 to 2.78, P<0.001). The resting heart rate of the experimental group was significantly better than that of the control group (MD=-4.50, 95%CI: -8.85 to -0.14, P=0.04). LVEF in the experimental group was significantly better than that of the control group (MD=0.09, 95%CI: 0.01 to 0.17, P=0.02).The physical condition of the experimental group was better than that of the control group, and the difference was statistically significant (MD=3.00, 95 %CI: 0.46 to 5.54, P=0.02).

Quality assessment / Risk of bias analysis: Cochrane risk-of-bias tool was used to evaluate the quality of RCTs, including random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selectivity reporting, and other sources of bias. If the included literature ultimately met the above items with low bias, its quality grade was A; if it partially conformed to these items with moderate bias, its quality grade was B; if it was utterly non-compliant, its quality grade was C, and such study should be excluded.

Strategy of data synthesis: We analyzed continuous data as mean difference (MD) or standardized mean difference (SMD), with a 95% confidence interval (CI), depending on whether the units of the results are consistent. The I2 value and P value were used to evaluate the heterogeneity. When P≥0.1 and I2≤50%, it indicated heterogeneity between the studies, and the fixed effect model was used. Otherwise, the random-effects model was used. Since there were no more than ten articles in this study, publication bias and meta-regression were not analyzed. To analyze the robustness of the results, sensitivity analyses were processed by the leave-one-out method. RevMan 5.3 software was used for analysis. Significant significance was set at P<0.05.

Subgroup analysis: Not applicable.

Sensitivity analysis: Sensitivity analysis indicates that the study, excluding the heterogeneity of the results of the study, but the results of the analysis did not change, indicating that the results are stable.

Country(ies) involved: China/Tongji University School of Medicine, Shanghai.

Keywords: Atrial fibrillation; Radiofrequency ablation; Exercise rehabilitation; Meta-analysis.

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