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Exercise as an adjuvant therapy against chronic atrial fibrillation

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Regular light-moderate exercise (*e.g.*, walking/brisk walking) attenuates risk of atrial fibrillation (AF) [1]. Yet another question is the potential therapeutic effects of exercise in patients who already suffer chronic AF, particularly old people. We performed a systematic review of studies that have investigated the exercise effects in old people with chronic ('permanent') AF on: AF reversion, AF burden, or other relevant medical outcomes, *i.e.*, exercise capacity indicators (mainly peak oxygen uptake [VO_{2peak}]) and health-related quality of life (QoL).

Searches (with no restriction on publication date) of human-based studies written in English, Spanish or French were done in Pubmed, ScienceDirect, and Scopus using the terms "atrial fibrillation", "physical activity", "exercise", "quality of life", "exercise therapy" and "treatment" as well as combinations thereof. Review papers, meta-analyses and symposium/meeting publications were excluded.

The Cochrane Collaboration risk-of-bias tool was used for assessing the quality of the revised papers. It includes 6 items (random sequence generation [selection bias], allocation concealment [selection bias], participants' blinding, incomplete outcome data, selective outcome reporting [reporting bias], and other sources of bias that were scored as '1' (positive), '0' (negative) or '?' (unclear). A total quality-score was calculated for each paper by adding the number of positive items. Studies were ranked as high/low quality, *i.e.*, a score <4 or ≥4 implies 'low' or 'high-quality' evidence, respectively.

From 2824 published articles on exercise and AF, 883 were potentially eligible. Of these, 45 were potentially relevant studies and 7 articles were finally identified as relevant studies [2–8] (Fig. 1). Of them, 86% (n = 6) were 'high-quality' papers [2–4,6–8] (Table 1). Taken together, the 7 studies included 142 patients (80% men) with chronic AF of varying ages (usually ≥60 years), with mixed underlying cardiovascular diseases (CVD) that are commonly associated with AF (hypertension, coronary artery or valve disease) although most patients had no severe heart failure or ventricular dysfunction. Patients received common drug combinations against AF or underlying CVD (β-blockers, digoxin, diuretics, calcium–antagonists, anticoagulants). No adverse effects associated with exercise were reported in any of the studies.

One report assessed the effects of *acute* exercise (modified Bruce protocol) in patients with AF aged 36–74 years [6]. In 5 of 18 patients scheduled for cardioversion, AF successfully reversed with the exercise challenge. None of the other 13 patients who failed to revert AF with the exercise test did so 3 h to 7 months later (median = 20 days). The study was however an observational one and was not performed *ad hoc*. There was heterogeneity in the duration of AF before presentation for cardioversion (8 h–7 months), which precludes extrapolating the findings. No study has specifically assessed the potential effect of *chronic* exercise for reverting chronic AF.

Two prospective studies showed significant benefits of regular moderate-intensity exercise (walking/jogging) performed during 4 [5] to 12 months in the exercise capacity of chronic AF patients but no effects were reported in terms of AF burden itself [2]. Of the 7 revised studies, only 3 were randomized controlled trials (RCT) assessing *ad hoc* the effects of an exercise intervention of 2 [4] to 3-month duration [7,8] performed by old patients (≥60 years) with permanent AF, on important end-points (although not directly related to AF itself), *i.e.*, exercise capacity (aerobic or muscle strength tests) or health-related QoL. Two of these RCTs [7,8] apparently shared the same patient population and exercise intervention. Essentially all of the abovementioned outcomes improved with training. The only AF-burden related outcome that has been assessed in an exercise RCT is AF symptoms (frequency/severity), using the arrhythmia-related symptom severity check list (SSCL) in a study reporting attenuation of symptoms after a 2-month

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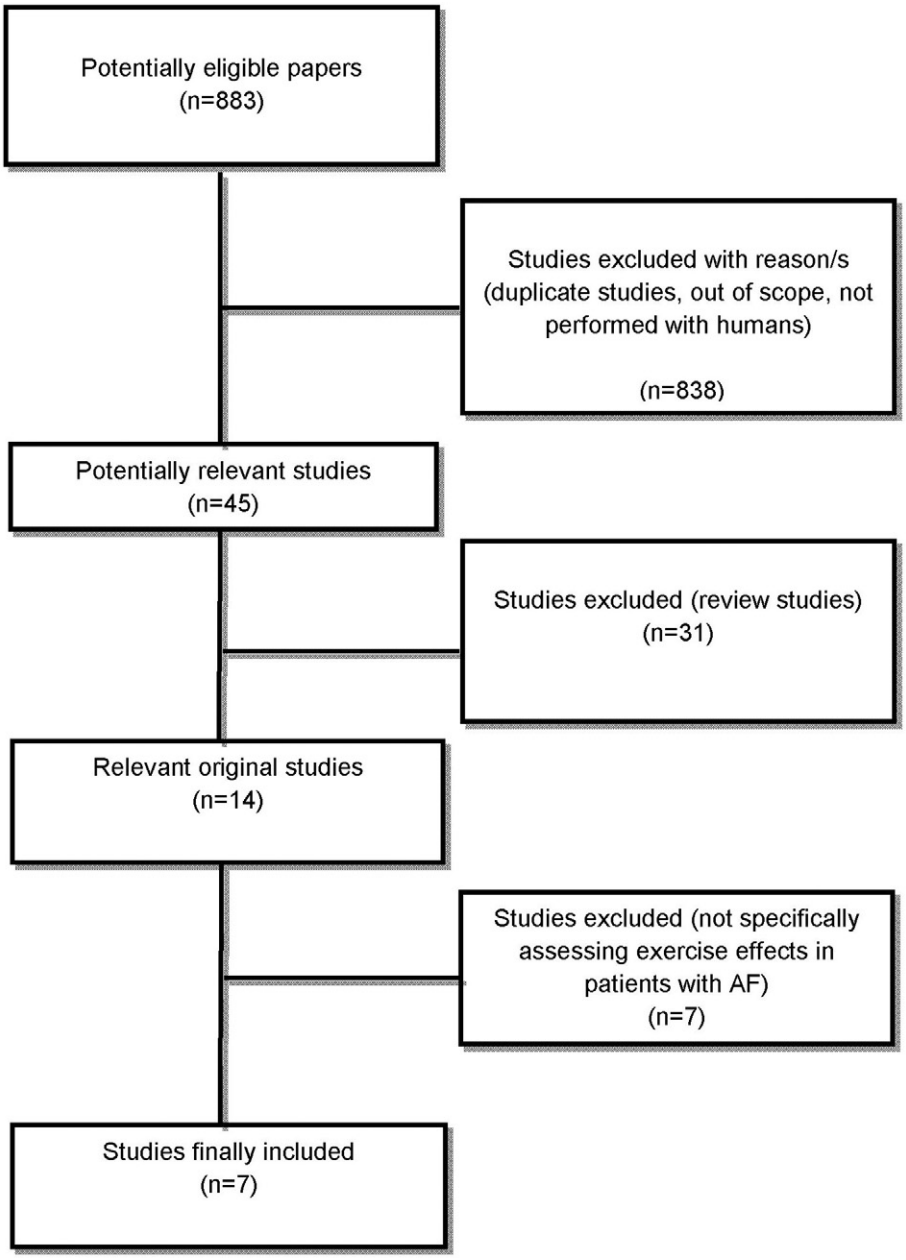

Fig. 1. Flow chart of studies.

moderate-intensity (70–80% of maximum heart rate) exercise intervention [4].

Finally, a case–control study showed no significant differences between cardiac patients with chronic AF (mean age 63 years) and their AF-free referents in the magnitude of the improvements induced by a 3-month exercise ambulatory program (+31% and +25%, respectively) [3].

The evidence available is based on a low number of studies, usually with small cohorts, and thus well-powered RCTs are needed. No RCT has specifically targeted feasibility and safety as main study outcomes, which should be studied in first place when analyzing the effects of exercise in diseased populations. Keeping these limitations in mind, current data would overall support the safety of light-moderate exercise for old people with chronic AF. This is important because these individual present several problems in terms of exercise prescription and supervision. Ventricular rate is usually increased in the presence of AF, owing to the absence of atrial kick, with consequent decreases in ventricular filling and thus in stroke volume. The fact that VO_{2peak} is low in chronic AF patients (see below), even in the presence of a higher maximal heart rate (compared to their AF-free peers) and normal resting left ventricular function, suggests they also have an attenuated stroke volume exercise response [2].

Although exercise interventions do not necessarily impact chronic AF *per se* or AF burden (there is very scarce data on these outcomes anyway), they seem to improve VO_{2peak} and health-related QoL. Especially important is to increase VO_{2peak} in these patients, because they usually have very low levels at baseline, *e.g.*, averaging 14.8 ± 3.6 [2] or 16.9 ± 5.2 mL/kg/min [3]. These VO_{2peak} values are well below the minimum threshold of fitness, *i.e.*, 8 metabolic equivalents (MET), which is equivalent to 28 ml/kg/min, above which risk of CVD-related mortality is significantly reduced [9]. Finally, more research, preferably using RCT designs, is needed on the potential of regular exercise to revert chronic AF.

In summary, while keeping in mind the aforementioned limitations, the current evidence would indicate that exercise interventions are safe and increase AF patients' VO_{2peak} and health-related QoL. Before more