CLINICAL STUDY

Functional Capacity After Traditional Chinese Medicine (Qi Gong) Training in Patients With Chronic Atrial Fibrillation: A Randomized Controlled Trial

Lucio Pippa, MD;[1] Lamberto Manzoli, MD, MPH;[2] Itala Corti, MD;[3] Gabriele Congedo, MD;[1] Luigi Romanazzi, MD;[4] Giustino Parruti, MD, PhD[1,5]

Evidence indicates that low energy expenditure protocols derived from traditional Chinese medicine may benefit patients with cardiac impairment; therefore, the authors carried out a randomized controlled trial to test a 16-week medically assisted qi gong training program for the physical rehabilitation of patients with stable chronic atrial fibrillation and preserved left ventricular function. Functional capacity variation was evaluated using the 6-minute walk test, which was performed at baseline, at the end of the intervention, and after 16 weeks. Thirty men and 13 women (mean age, 68±8 years) were randomized to the intervention protocol or to a wait-list control group. Qi gong training was well tolerated and, compared with baseline, trained patients walked an average 114 meters more (27%) at the end of treatment (P<.001) and 57 meters more (13.7%) 16 weeks later (P=.008). Control subjects showed no variation in functional capacity. These results seem promising and deserve confirmation with further research. (Prev Cardiol. 2007;10:22–25) ©2007 Le Jacq

From the Fondazione Camillo de Lellis per la Ricerca Clinica Applicata, Pescara, Italy, and Fondazione Matteo Ricci, Bologna, Italy;[1] Section of Epidemiology and Public Health, University of Chieti-Pescara "G. D'Annunzio," Chieti, Italy;[2] the Clinical Pathology Unit, Ospedale Civile di Lanciano, ASL Lanciano-Vasto, Lanciano, Italy;[3] the Cardiology Unit, Ospedale "S. Massimo," Penne, Italy;[4] and the Infectious Disease Unit, Ospedale Civile di Pescara, ASL Pescara, Italy[5]
Address for correspondence:
Lamberto Manzoli, MD, Sezione di Epidemiologia e Sanità Pubblica, Università "G. d'Annunzio" di Chieti, Via dei Vestini 5, Chieti, Italy
E-mail: lmanzoli@post.harvard.edu
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Despite normal left ventricular function, patients with chronic atrial fibrillation (AF) often complain of limited exercise capacity and breathlessness.[1,2] In these patients, physical training has received little attention, although it has become a standard therapeutic approach for rehabilitation in patients with chronic heart disease and any degree of impairment in cardiac function.[3,4] A few small studies indicate that a 1-year unsupervised walking program[5] and a 3-month controlled program of standard aerobic exercise[6] were safe and efficacious. Another small trial, however, indicated that intense exercise training might induce a hypercoagulable state in patients with chronic AF.[7] Because of this concern, a training technique combining low energy expenditure and emotional control may be preferable for the rehabilitation of these patients. A training technique described as having such characteristics, qi gong (a traditional Chinese medical discipline),[8] has been evaluated in elderly patients with various degrees of cardiopathy, showing significantly enhanced cardiorespiratory function.[8–11]

We carried out a randomized controlled trial to examine the efficacy of a 16-week medically assisted practice of qi gong exercises on improving functional capacity in patients with stable chronic AF and preserved left ventricular function.

METHODS

Participants

Patients were eligible for the study if they had been diagnosed with AF at least 3 months prior and were taking anticoagulant treatment for at least 2 months. Exclusion criteria included deterioration of cardiac function (ejection fraction <30% and/or New York Heart Association class III–IV), history or suspicion of a recent thromboembolic event, recent heart rate instability or other indication for electrocardiographic monitoring during exercise training, chronic systemic diseases in the acute

Table I. Baseline Characteristics of the Sample

Variables	Treatment (n=22)	Control (n=21)	P^*
Age, mean ± SD, y	68.3±7.2	67.8±9.1	.80
Male sex, %	63.6	76.2	.29
Currently married, %	81.8	95.2	.19
Low income (<€18,000 per year), %	22.7	38.1	.22
Current smoking, %	13.6	9.5	.69

*Kruskal-Wallis test for continuous variables; Fisher's exact test for categoric variables.

Table II. Outcome and Control Variables at Baseline, the End of Training, and After 16 Weeks (Follow-Up)

	Treatment Group (n=22)			Control Group (n=21)				
Outcome Variable	Pre-training	Post-training	Follow-Up	Pretraining	Post-training	Follow-Up	P^*	P†
Six-minute walk, m‡	417 (107)	531 (121)	474 (109)	371 (75)	380 (97)	350 (110)	<.001	.008
Control variables								
Body mass index	26.4 (3.1)	26.4 (3.1)	26.8 (3.1)	25.1 (3.4)	25.0 (3.3)	25.4 (3.8)	.96	.39
Total cholesterol, mg/dL	198 (44)	194 (46)	202 (32)	197 (46)	192 (34)	192 (37)	.49	.68
High-density lipoprotein, mg/dL	46.1 (10)	43.6 (6)	45.4 (6)	48.0 (11)	46.1 (13)	45.1 (11)	.99	.25
Homocysteine, mmol/L	13.3 (4.0)	15.4 (6.7)	15.3 (6.8)	15.1 (3.5)	16.3 (2.6)	16.6 (5.0)	.50	.41
Ejection fraction, %§	60.6 (15)	61.1 (10)	—	61.4 (12)	58 (12)	—	.86	—

Data are expressed as mean (SD). *P for difference in the change pretraining and posttraining between the treatment and control groups (Wilcoxon rank sum test). †P for difference in the change pretraining and 16 weeks after training. ‡Distance walked in 6 minutes measured in meters. §Data available for 17 participants and 7 controls only.

phase, bone or joint conditions limiting exercise training, major logistic impairments, involvement in regular training programs, and inability to give informed consent. A cardiologist evaluated medical files of candidates, performed ultrasonography, and classified each participant as eligible. The local ethics committee approved the protocol, and signed informed consent was obtained from all participants. Between January 2004 and February 2005, a total of 47 eligible patients were identified at the study site (Hospital of Lanciano, Italy). Of them, 43 agreed to participate and were randomly assigned to treatment or to a wait-list control group using a computer-generated random table. The final sample consisted of 30 men and 13 women of white race, with a mean age of 68±8 years. After randomization, the baseline characteristics between the intervention and control groups did not differ significantly (Table I and Table II). One patient in the intervention group and 2 patients in the control group were diagnosed with mild-to-moderate chronic obstructive pulmonary disease not requiring oxygen supply at any time since the diagnosis.

Intervention

Before the start of the study, all participants received 2 hours of training on best practices for cardiovascular risk management,[3,4] offered during 3 sessions during a 2-week period. Patients in the intervention group participated in two 90-minute sessions of qi gong training per week, for a total of 32 sessions (16 weeks). The term *qi gong* refers to a set of static exercises developed thousands of years ago, considered introductory to the renowned tai ji quan. In qi gong, deep diaphragmatic breathing and the practice of many postures, flowing smoothly from one to the other through slow and graceful movements, is reported to induce emotional control, increase muscle tone, and enhance body flexibility and strength.[8,12] Qi gong belongs to the group of traditional Chinese medical disciplines and requires very low energy expenditure to be practiced, which makes it easily accessible.[8,13] A detailed description of the qi gong standard methodologies practiced in the present intervention has been published elsewhere.[12,14] All sessions were assisted by a physician and a therapist and time was allowed for participant queries.

Outcomes

The outcome of the study was the variation in the 6-minute walk performance between baseline, the end of training, and 16 weeks after the end of the intervention. The 6-minute walk test measures how far a participant can walk in 6 minutes at the best rate he/she can perform and is considered a reliable

index of global functional capacity.[15,16] Tests were performed following standard recommendations by Guyatt and colleagues[15] under identical conditions for all patients. To evaluate potential adverse effects, in addition to standard clinical follow-up, the ejection fraction (measured by 2-dimensional echocardiography), body mass index, and biochemical markers (total cholesterol, high-density lipoprotein, homocysteine) were also measured at baseline, at the end of the training, and at the 16-week follow-up visit.

RESULTS

Three patients in the intervention group did not complete the training program: 2 showed limited interest in the study and 1 had a retinal embolism. All 3 attended at least half of the sessions, however, and their parameters were recorded at the 3 assessments; therefore they were included in the final analysis. One case of retinal embolism and 1 case of deep vein thrombosis were the only cardiovascular events recorded in the control group during follow-up.

Significant improvement in functional capacity was observed in the subjects who attended the training protocol (Table II). At the end of the study, treatment group members walked an average of 114 meters more (27%) compared with baseline assessment ($P<.001$). The improvement was reduced but still significant 16 weeks after the end of the intervention, when the distance walked by trained participants was still 13.7% longer than baseline ($P=.008$). Controls did not show any variation in functional capacity between preintervention and postintervention evaluations (Table II).

None of the measures of clinical and biochemical parameters revealing possible adverse effects of the program (body mass index, total cholesterol, high-density lipoprotein, homocysteine) showed significant differences between treatment and control groups at any follow-up sessions. Similarly, ventricular ejection fraction did not significantly vary across groups, although this information was available for only 24 patients due to a loss of data by the cardiology unit involved (Table II).

DISCUSSION

To date, stress-coping strategies and low energy expenditure protocols have been tested mostly in patients with severe cardiac impairment,[8,9,13,17,18] and a few studies have been published examining the effect of exercise training on chronic AF in patients with preserved ventricular function.[5,6] Although in the latter patients significant improvements were more difficult to induce and document, both studies reported encouraging results. In this study, qi gong training was evaluated for the first time in patients with chronic AF and preserved ventricular function, suggesting that this rehabilitation technique has the potential to induce a significant and long-lasting improvement in physical capacity.

Previous trials investigated the effect of isotonic aerobic exercise, practiced 2 or 3 times a week in 90-minute sessions, on peak oxygen intake[5,6] and resting heart rate,[6] whereas we used a different functional ability assessment method, the 6-minute walk test, which is simpler but reliable.[16] A comparison would therefore be complicated, but it is worth noting that regardless of the outcome variable, this and previous trials showed improvements of the same magnitude.[5,6]

The protocol was well tolerated, with no serious adverse events recorded and no significant variation observed in the selected biochemical parameters among trained patients. Despite possible concerns about heart rate variations induced by the exercise program, none of the patients complained of heart rate–related symptoms during or close to a training session, and no arrhythmic episode was diagnosed at clinical checks. In addition, and beyond expectancy, most of the trained patients enjoyed attending the intervention, with some reporting additional home practice, an improvement in their perception of well being, and a reduction in anxiety. This is particularly encouraging because the potential for long-term adherence is a critical issue for this kind of intervention, as well as for any other type of treatment.[19]

It must be taken into account that our study was based on a small sample from a single center, examined only a few outcomes, had no placebo interventions, and included patients who were followed quite intensively as members of a popular nonprofit organization (Associazione Italiana Pazienti Anticoagulati), which facilitated their attendance to sessions and tests by pickups, reminders, and frequent counseling. This may have added relevant psychophysical support, increasing the ultimate benefit of the intervention on physical performance of participants. Because of these limitations, our findings require confirmation from larger, multicenter studies, possibly using more objective outcomes.

In conclusion, in patients with chronic AF and preserved ventricular function, a training program based on traditional Chinese medicine showed a significant improvement in physical capacity. This finding might have relevant implications for cardiac patients and could expand the range of those who benefit from rehabilitation interventions. Further research is warranted.

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