[Original Research]

CHEST

Tai Chi and Pulmonary Rehabilitation Compared for Treatment-Naive Patients With COPD

A Randomized Controlled Trial

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VIDEO

BACKGROUND: In COPD, functional status is improved by pulmonary rehabilitation (PR) but requires specific facilities. Tai Chi, which combines psychological treatment and physical exercise and requires no special equipment, is widely practiced in China and is becoming increasingly popular in the rest of the world. We hypothesized that Tai Chi is equivalent (ie, difference less than ±4 St. George's Respiratory Questionnaire [SGRQ] points) to PR.

METHODS: A total of 120 patients (mean FEV_1, 1.11 ± 0.42 L; 43.6% predicted) bronchodilator-naive patients were studied. Two weeks after starting indacaterol 150 μg once daily, they randomly received either standard PR thrice weekly or group Tai Chi five times weekly, for 12 weeks. The primary end point was change in SGRQ prior to and following the exercise intervention; measurements were also made 12 weeks after the end of the intervention.

RESULTS: The between-group difference for SGRQ at the end of the exercise interventions was −0.48 (95% CI PR vs Tai Chi, −3.6 to 2.6; $P = .76$), excluding a difference exceeding the minimal clinically important difference. Twelve weeks later, the between-group difference for SGRQ was 4.5 (95% CI, 1.9 to 7.0; $P < .001$), favoring Tai Chi. Similar trends were observed for 6-min walk distance; no change in FEV_1 was observed.

CONCLUSIONS: Tai Chi is equivalent to PR for improving SGRQ in COPD. Twelve weeks after exercise cessation, a clinically significant difference in SGRQ emerged favoring Tai Chi. Tai Chi is an appropriate substitute for PR.

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ABBREVIATIONS: 6MWD = 6-min walk distance; MCID = minimal clinically important difference; mMRC = modified Medical Research Council dyspnea score; PR = pulmonary rehabilitation; SGRQ = St. George's Respiratory Questionnaire

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Drs Zhong and Luo contributed equally to the study.

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COPD is a progressive lung condition and a common cause of adult mortality globally.[1] In the absence of a therapy that can reverse parenchymal lung damage, the most effective treatment for improving quality of life and exercise performance is pulmonary rehabilitation (PR).[2-5] Although PR is highly effective in completers, a center/gymnasium-based approach limits provision, and the benefits wane after course completion.[2]

Tai Chi is a Chinese recreational exercise that is gradually becoming more popular worldwide.[6-8] Tai Chi improves symptoms in several chronic diseases, including fibromyalgia[8] and Parkinson's disease.[7] Pilot studies have shown that Tai Chi represents a significant exercise load compared with standard exercise modalities, suggesting that Tai Chi could, as with PR, improve physical function and quality of life in patients with COPD.[9,10] However, there has been no large-scale comparison of Tai Chi with conventional PR, which precludes an unqualified rollout of Tai Chi to replace PR. We therefore undertook a comparison of Tai Chi and PR against a background of standardized bronchodilator use to test the hypothesis that Tai Chi and PR were of equivalent benefit in COPD, judged by using the St. George's Respiratory Questionnaire (SGRQ).

Patients and Methods

Overview

The study was undertaken at Xing-Ning People's Hospital and was approved by the ethics committee of First Affiliated Hospital of Guangzhou Medical University; participants provided written informed consent. Patients were recruited from the community (using advertisements) based on their age, smoking history, and symptoms (cough/breathlessness); patients were bronchodilator naive. Eligible patients were aged between 40 and 80 years with postbronchodilator $FEV_1 \geq 25\%$ and $< 80\%$ of predicted and FEV_1/vital capacity < 0.7.

Measurements were made prior to and following a 2-week run-in period when indacaterol 150 μg once daily was started (visits 2 and 3). Patients were randomized at visit 2 to receive 12 weeks of either Tai Chi or center-based rehabilitation, after which further measurements (visit 6) were made. Indacaterol was continued for an additional 12 weeks, after which final measurements were made (visit 9). Intermediate visits were also conducted (e-Fig 1) but are not reported for clarity.

Intervention

Tai Chi was taught as a 24 form Yang style; instruction was given 5 days per week for 1 h for 12 weeks. Initially, patients were taught two to three movements each day and typically took 2 weeks to master them; at this point, each instructor supervised two to three participants. Thereafter, the participants were able to join larger group training in which a single instructor provided instructions that were relayed to all group members in the hall by real-time video streaming. At the end of the 12-week period, participants were encouraged to continue Tai Chi, either alone or via a community group; however, no assistance was provided by the investigators during this period. Inherent to the group nature of Tai Chi practice, the exercise did not become more strenuous over the training period although participants became more accomplished at performing it. A video of the larger Tai Chi group undertaking Tai Chi may be viewed online (Videos). This group also received educational input.

The PR program was based on standard UK practice; at study initiation, the training used was supervised and checked by an experienced British physiotherapist (B. M.). Briefly, a 12-week program with 1-h training session (with warm-up and cool-down phases as well) thrice weekly was used. Participants undertook a mixture of approximately 50% resistance exercises (arm and leg weights aiming for a target 70%-80% of their one-repetition maximum), hybrid (rowing machine), and 50% progressive aerobic whole body exercise (eg, cycle or treadmill) in addition to educational sessions. For the aerobic exercise, the patient's level of dyspnea was recorded after each exercise session and was titrated to achieve a BORG rating of perceived dyspnea level of 4 to 6. At the end of the program, participants received verbal encouragement to remain as physically active as possible. Further details may be found in e-Appendix 1.

Measurements

The SGRQ, the primary end point, was measured at visits 2, 3, 6, and 9; secondary measures made at the same time points were FEV_1 (as % predicted) and 6-min walk distance (6MWD), and the primary comparison was made between the start and finish of exercise training (visit 3 to visit 6). SGRQ was administered by using a Mandarin version of the questionnaire,[11] and spirometry was performed by using a hand-held spirometer (microQuark, COSMED) in line with American Thoracic Society guidelines. We also measured the modified Medical Research Council dyspnea score (mMRC), short physical performance battery score,[12] height, mass (allowing calculation of BMI), fat-free mass by bioimpedance (BCA-1A, Member Enterprise of Tongfang Co, Ltd),[13] and quadriceps maximum voluntary contraction force in the dominant leg,[14] as well as data concerning hospital admission/ED attendance. Physical activity over 7 days (ActiGraph) was measured at screening (visit 1) and, not to overburden patients to finish, at visit 6 (ie, starting 11 weeks after starting the training intervention) and visit 9 (ie, starting 11 weeks after finishing the training intervention).

In the absence of pilot data, a formal power calculation was not possible; however, based on the earlier research of Casaburi et al,[15] in which a statistically significant improvement in SGRQ following tiotropium and PR had been observed, we aimed to recruit sufficient participants to have 50 "completers" in each group. Projecting an approximate 20% dropout, 60 patients were specified a priori in each group.

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