Original Article

Tai Chi Exercise for Cancer-Related Fatigue in Patients With Lung Cancer Undergoing Chemotherapy: A Randomized Controlled Trial

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Abstract

Context. Tai Chi is a traditional Chinese health-promoting exercise. It has been shown to enhance mental health and improve psychological condition.

Objectives. We aimed to assess the effectiveness of Tai Chi exercise for cancer-related fatigue in patients with lung cancer undergoing chemotherapy.

Methods. We conducted a randomized trial of Tai Chi exercise as compared with low-impact exercise as a control intervention. Exercises were practiced every other day, a one-hour session for 12 weeks for each of the study groups. The primary end point was a change in total score of the Multidimensional Fatigue Symptom Inventory—Short Form (MFSI-SF). Secondary end points were changes in five subscale scores of the MFSI-SF. All assessments were repeated at three time points, T0: before first course of chemotherapy; T1: before third course of chemotherapy; and T2: at the end of the fourth course of chemotherapy.

Results. Between January 2012 and December 2014, 96 patients were enrolled in this trial. At six and 12 weeks, the Tai Chi group had a lower MFSI-SF total score compared with the control group (59.5 ± 11.3 vs. 66.8 ± 11.9, $P < 0.05$; 53.3 ± 11.8 vs. 59.3 ± 12.2, $P < 0.05$). At six weeks, the Tai Chi group had lower MFSI-SF general subscale scores (18.1 ± 4.6 vs. 20.4 ± 4.5, $P < 0.05$) and physical subscale scores (17.5 ± 4.4 vs. 19.1 ± 4.5, $P < 0.05$), and higher MFSI-SF vigor subscale scores (14.5 ± 3.3 vs. 11.6 ± 3.4, $P < 0.05$), compared with the control group. But no significant differences were found in emotional subscale (20.2 ± 3.6 vs. 20.0 ± 3.5, $P > 0.05$) and mental subscale (18.2 ± 4.0 vs. 18.9 ± 3.9, $P > 0.05$) scores between the Tai Chi group and the control group. At 12 weeks, the MFSI-SF subscale scores showed the same trends as at six weeks.

Conclusion. Tai Chi is an effective intervention for managing cancer-related fatigue in patients with lung cancer undergoing chemotherapy, especially for decreasing general fatigue and physical fatigue, and increasing vigor. J Pain Symptom Manage 2016;51:504—511.

Key Words
Lung cancer, cancer-related fatigue, Tai Chi exercise, chemotherapy

Introduction

According to the National Comprehensive Cancer Network, cancer-related fatigue (CRF) is defined as a persistent subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment.[1] CRF is a common symptom among patients with cancer. It has been reported in approximately 50%—75% of cancer patients at the time of diagnosis, and the prevalence increases to 80%—96% in patients undergoing chemotherapy and to 60%—93% in patients receiving radiotherapy.[2] CRF is a strong and independent predictor of decreased overall patient satisfaction and health-related quality of life.[3]

CRF management includes pharmacologic and non-pharmacologic interventions.[4] Although there is increasing evidence that psychostimulant agents

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provide improvement in CRF at a clinically meaningful level, the hemopoietic growth factors are associated with increased adverse outcomes. Therefore, these drugs can no longer be recommended in the treatment of CRF.[5] Exercise treatment is the most commonly used nonpharmacologic intervention for CRF. Meta-analyses have confirmed that exercise was able to significantly reduce CRF.[6,7]

Tai Chi is a traditional Chinese health-promoting exercise. It is an easily modifiable, low-to-moderate intensity form of physical exercise. Tai Chi has been found to have positive effects on Parkinson's disease[8] and chronic heart failure,[9] improves lung function and activity tolerance in patients with chronic obstructive pulmonary disease,[10] and improves balance and reduces falls in older adults.[11] It also has been shown to enhance mental health and improve psychological conditions, including reducing geriatric depression,[12] reducing anxiety,[13] and enhancing self-efficacy.[14] Tai Chi also has been found to have positive effects in cancer patients. Mustian et al. reported that Tai Chi exhibited improvements in health-related quality of life and self-esteem from baseline to six and 12 weeks in breast cancer survivors.[15] Zhang et al. found Tai Chi Chuan can improve immune system function in postsurgical non−small cell lung cancer survivors. A 16-week Tai Chi intervention caused significantly attenuated CD55 expression.[16] Fong et al. also found Qigong and Tai Chi training may improve peripheral circulatory status and functional aerobic capacity among survivors of nasopharyngeal cancer.[17] A meta-analysis that included 13 randomized controlled trials concluded that Tai Chi had positive effects on cancer-specific quality of life, fatigue, immune function, and cortisol level of cancer patients.[18]

Recently, it has been found Tai Chi can decrease CRF in breast cancer survivors at three-month follow-up.[19] However, Tai Chi has not been tested as an intervention for reducing CRF in patients with lung cancer undergoing chemotherapy. In the present study, we aimed to assess the effectiveness of Tai Chi exercise for CRF in this population.

Methods

Study Design

This was a prospective, randomized, controlled intervention trial evaluating Tai Chi exercise in patients with lung cancer undergoing chemotherapy. It was approved by the Ethics Committee of our hospital. All patients gave written informed consent.

Eligibility Criteria and Exclusion Criteria

Eligibility criteria were as follows: 1) lung cancer diagnosis confirmed by clinical assessment, chest X-ray, computed tomography, or histological examination; 2) receiving 2−4 courses of cisplatin-based chemotherapy for a 21-day cycle; 3) age ≥ 18 years; 4) Eastern Cooperative Oncology Group Performance Status 0−3; and 5) willing to participate in Tai Chi exercise or low-impact exercise. Exclusion criteria were as follows: 1) patients with contraindications for resistance training, such as moderate-to-severe heart failure; 2) already participating in Tai Chi exercise before chemotherapy; 3) unable to complete fatigue score assessment; and 4) participants cannot insist on Tai Chi exercise or low-impact exercise.

Recruitment and Randomization

Between January 2012 and December 2014, patients with lung cancer undergoing chemotherapy in our hospital were enrolled in our study. Patients were randomly allocated 1:1 to the Tai Chi exercise group or low-impact exercise control group. Randomization was accomplished by computer-generated random number. Allocation was performed by third-party personnel uninvolved in recruitment.

Interventions

In the Tai Chi exercise group, participants practiced a simplified Yang style.[20] Tai Chi was taught by experienced Tai Chi instructors in the community and by instructional DVD. The Eight-Form Easy Tai Chi included the following: 1) commencing form (both hands rise to shoulder level); 2) curving back arms; 3) stepping sideways and moving arms; 4) moving hands; 5) diagonal strides; 6) standing on one leg; 7) stepping and pushing; and 8) closing form (both hands fall to the side, left leg drawn to the right leg).[21] Each session included five to 10 minutes of warm-up, followed by Tai Chi practice. In the practice session, participants paid attention to movement coordination and regulated breathing.

In the low-impact exercise group, participants practiced arm, neck, and leg circles, followed by stretches for upper and lower body muscle groups along with deep abdominal breathing.

Both Tai Chi exercise and low-impact exercise interventions were performed at home or in the community when patients recovered from their chemotherapy response. The exercises began on the 10th day during the 21-day chemotherapy cycle. Both Tai Chi exercise and low-impact exercise were practiced every other day, for one hour in the morning, between approximately 8:00 to 10:00 AM. The exercise program is shown in the Figure 1.

Exercise implementation was offered to patients hospitalized for chemotherapy. If the participants were unable to perform Tai Chi exercise or low-impact exercise, they were excluded from the study