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Current trends in tai chi for stroke rehabilitation

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Abstract *Background:* There are an increasing number of studies focusing on the effect of tai chi for different diseases. As a special form of physical activity, tai chi may be beneficial for the rehabilitation of stroke, a leading cause of disability worldwide.

Objective: This review summarizes the existing literature on the potential benefits of tai chi for stroke rehabilitation and offers recommendations for future research.

Methods: Studies on the biomechanics and physiology of tai chi for stroke rehabilitation are reviewed. Research on tai chi for stroke rehabilitation and related diseases are summarized. Finally, the shortcomings of existing studies and recommendations for future studies are discussed.

Conclusions: Tai chi appears to be beneficial for stroke rehabilitation. But reporting quality of existing studies are sub-optimal. Future trials should define tai chi style, apply rigorous methodology to sample size calculation, randomization, recruiting criteria, and outcome measures. To avoid inadequacies during the research and reporting processes, investigators may wish to follow CONSORT guidelines and refer to well-conducted clinical studies on tai chi.

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Introduction

Stroke is the second most common cause of death and a major cause of disability worldwide.¹ Stroke greatly impacts quality of life of survivors and is an immense public health burden.² With the population aging and lifestyle changing, the burden is projected to increase markedly during the next 20 years, especially in developing countries.³ An epidemiologic study published in 2007 indicated that China had over 7 million stroke survivors, approximately 70% of whom experienced functional disabilities.⁴ This reality is a powerful impetus to search for effective modalities of treatment for stroke rehabilitation.

Tai chi (also known as tai ji or tai chi chuan) is a form of physical activity that is widely practiced in China and throughout the world. Tai chi originated in China as a martial art hundreds of years ago.⁵ Based on the mind-body connection, tai chi combines breathing control, meditation, and physical movement, to settle and relax the mind, with the aim of enhancing balance, strength, posture, coordination, and flexibility.⁶ Numerous studies have been conducted on the clinical application of tai chi,^{7,8} and have validated its effect in improving symptoms of conditions such as fibromyalgia and Parkinson disease.^{9,10}

Physical activity is an important component of stroke rehabilitation to reduce disability. Thus, tai chi has been incorporated into stroke rehabilitation programs.^{11–13} The objective of this review is to summarize the literature on the potential benefits of tai chi for stroke rehabilitation and to offer recommendations for future research.

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The biomechanics and physiology of tai chi for stroke rehabilitation

Tai chi is a blend of slow, gentle, helical movements and meditation, deep breathing, and full-body relaxation. It is a unique intervention that integrates physiology, psychology, physiologic, psychological, emotional, spiritual, and behavioral components.⁹ The core of tai chi practice is similar to that of the Bobath and proprioceptive neuromuscular facilitation (PNF) stroke rehabilitation techniques, making tai chi to stroke rehabilitation.^{13,14} A previous review also suggested that tai chi is safe and viable for persons with disabilities and may serve as an additional exercise modality of rehabilitation among stroke survivors.¹¹

The helical nature of most tai chi movements are aimed at strengthening the limbs and core muscles of the abdomen and back.¹⁵ This corresponds with conventional stroke rehabilitation techniques, which also focus on strength exercises for the limbs and the trunk. Since tai chi is practiced while on the feet, it is also a weight-bearing exercise that improves balance similar to conventional rehabilitation.¹⁴ Research by Matjacic et al demonstrated that helical movements increase stimulation of neuronal excitability of motor neurons in stroke patients.¹⁶ The requirement of deep breathing and relaxation of the body

and mind when practicing tai chi is consistent with stroke rehabilitation therapies that encourage patients to relax and stay calm to achieve a better recovery. One of the most important principles of tai chi is “conquering the unyielding with the yielding,” which corresponds with physiotherapy treatment of spasticity with gentle manipulation.

Clinical studies on tai chi for stroke rehabilitation

Our original intention was to conduct a systematic review of tai chi for stroke rehabilitation. However, after meticulous literature retrieval in databases that included the Cochrane Library, PubMed, EMBASE, Chinese Biomedical Database, Wanfang Database, and China National Knowledge Infrastructure up to March 2015, we found only a limited number of studies that applied tai chi for stroke rehabilitation.¹⁷ Thus, instead of a systematic review, we present a general review of results of the studies below.

Taylor-Piliae et al. conducted a prospective pilot study in which 28 stroke survivors attended a community-based Yang-style tai chi program. Outcome measures included safety, program adherence, falls or adverse events, and participant satisfaction. Results indicated that tai chi was well tolerated with an adherence rate of 92% with no falls or other adverse events. Participants were highly satisfied. Thus, Yang-style tai chi is safe and achievable as a community-based rehabilitation program for stroke patients.¹⁸ A single-blind, randomized controlled trial also by Taylor-Piliae et al. examined how tai chi affected physical function, including fall rates and quality of life in stroke patients.¹⁹ There were 145 participants who were 50 years of age or older and 3 or more months post-stroke. Participants were randomized to 3 groups: short-form tai chi, strength and range of movement exercises (SS), and usual care. During the 12-week study, the tai chi and SS groups attended a 1-h class 3 times a week, and the usual care group received written materials and resources on physical activity and had weekly phone calls provide individual attention and monitor their health. Results showed that tai chi intervention reduced fall rates more effectively than SS or usual care interventions.

Researchers in Hong Kong carried out a randomized controlled trial to investigate whether short-form tai chi improved standing balance in stroke survivors.²⁰ Adapted from Sun-style tai chi, short-form tai chi consists of 12 postures that require concentration to perform whole-body movements in continuous sequence. Patients with a history of stroke longer than 6 months after onset and the ability to walk at least 6 m were included in the study. A total of 136 patients were randomly assigned to a tai chi group or a general exercise group. Scores of dynamic standing balance, standing equilibrium, and time-up-and-go were evaluated at 6 weeks (mid-program), 12 weeks (end-program), and 18 weeks (follow-up). Results indicated that the tai chi group demonstrated significantly better improvements over the general exercise group in standing balance and equilibrium at the end-program and follow-up assessments but not in the timed-up-and-go scores.

A study by Zhou et al. investigated the effect of tai chi on balance, anxiety, and general quality of life in stroke

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