Tai Chi: A Mind-body Exercise for Pain Relief and Well-being

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“Beyond Drugs: How Alternative Treatments Can Ease Pain”
Around 2.5 million Americans practice Tai Chi and the number is rapidly increasing.

Tai Chi use was associated with higher reports of musculoskeletal conditions (OR 1.43, 95% CI 1.11-1.83).

Currently, there are 460 citations for Tai Chi research.
Selected Tai Chi Publications


Outline

• Overview of fibromyalgia and Tai Chi

• A randomized trial of Tai Chi for fibromyalgia

• Conclusion and clinical implications
Case Vignette (the New York Times)

Mary, 59, from Lynn, Mass.

“It hurt me so much just to put my hands over my head.”
“Sleeping was difficult”.
“I couldn’t walk half a mile.”
“There was no joy to life.”
“I was an entire mess from head to foot.”

PE: Multiple tender points; depressed

Mary rejected medication due to side effects. She tried physical therapy, swimming and other approaches.
Fibromyalgia Syndrome

• A common and complex Pain illness

• The second most common condition seen in rheumatologic practice in the US

• Very difficult to treat
Pharmacological Treatment of Fibromyalgia

• Analgesics

• Antidepressants

• Antiseizure drugs

Most of these treatments have modest efficacy when used as stand-alone therapy.
History of Fibromyalgia

Early 20th Century:
• Fibrositis- inflammation of fibrous tissue of muscles

Mid-1970s: termed fibromyalgia
• Muscle biopsy “abnormalities” found no different from deconditioned controls

Mid-1980s: a classified as disorder of the central nervous system
Pathophysiology- Current Theories

Central Nerve System pain deregulations
Brain Regional Blood Flow Response to Pain in Fibromyalgia vs Controls

Gracely et al, Arthritis & Rheumatism 2002; 46: 1333-1334
Pain Intensity correlated with executive attention network connectivity to the insula

Napadow et al, Arthritis & Rheumatism 2010; 62: 2535-2555
Summary of Brain Imaging Results

• Brain function or activity changes in patients with FM.

• Pain associated with FM may be mediated by central nervous system hyper-excitability.

• Brain activity within multiple networks is associated with spontaneous clinical pain.
Abnormal Pain Processing in Fibromyalgia

Bradley et al; Am J of Med. 2009
Pathophysiology – Current Theories

Stress-related disorder
- Abnormalities in the Hypothalamic-pituitary-adrenal axis

Neurotransmitter deficiency
- Low level of serotonin, norepinephrine, and dopamine metabolites in blood and cerebrospinal fluid

Physical and Psychological Change in Chronic Pain

Pain

Poor Quality of Life

Functional impairment

Sleep disturbance

Fatigue

Depression/Anxiety

Poor Self-efficacy
Tai Chi Mind-body Benefits for Chronic Pain

- Pain Reduction
- Relaxation
- Mental Health & Self-efficacy
- Coordination
- Mood
- Physical Function
- Cardio
What is Tai Chi?

A traditional Chinese martial art. Tai Chi combines meditation with slow, gentle, graceful movements, deep breathing and relaxation

Interactions between the brain, mind, body, and behavior

Physiological and psychosocial benefits for patients with chronic conditions

47 studies including randomized controlled trials, non-randomized studies, and observational studies published in English or Chinese.

Benefits were reported for balance and strength, cardiovascular and respiratory function, symptoms of arthritis, muscular strength and psychological well-being.

Additional well-designed studies are needed.
Tai Chi on psychological well-being: systematic review and meta-analysis

Chenchen Wang1, Raveendhara Bannuru1, Judith Ramel1, Bruce Kupelnick1, Tammy Scott2 and Christopher H Schmid2

- 8 English and 3 Chinese databases were searched through March 2009.

- 40 studies, totaling 3817 subjects, reported at least 1 psychological health outcome.

- The trials in each subcategory were meta-analyzed using a random-effects model.

- Tai Chi significantly improved psychological well-being.
Tai Chi: An Overview

• 35 reviews published between 2002 and 2010 were analyzed.

• The evidence is convincingly positive for fall prevention, improved balance, and improved psychological health.

*Lee and Ernst, BJSM, 2011; 1-6*
Study Aims

Explore the effects of Tai Chi on musculoskeletal pain, sleep quality, psychological distress, functional impairment and health status in patients with fibromyalgia.
Inclusion Criteria

• Age 21 or older

• American College of Rheumatology criteria for classifying fibromyalgia (1990)
  - History of widespread pain >3 months
  - Tender point sensitivity
Study Design

66 Eligible Participants

Randomized

Tai Chi
(n = 33)

Attention Control
(n = 33)

Duration of Intervention
12 weeks

Primary Outcome
Change in Fibromyalgia Impact Questionnaire Score from Baseline - 12 weeks
Primary Outcome Measure

Fibromyalgia Impact Questionnaire (FIQ)

- a validated multidimensional measure for participant-rated overall severity of Fibromyalgia.

- includes intensity of pain, physical functioning, fatigue, morning tiredness, stiffness, depression, anxiety, job difficulty and overall well-being.

- The total score ranges between 0 and 100 with higher scores indicating more severe symptoms.
Tai Chi - Intervention

- Classical Yang style Tai Chi

- 1 hour, 2 x /week (12 weeks)

- Every session included:
  1) Warm up and review Tai Chi principles
  2) Meditation with Tai Chi movement
  3) Breathing technique
  4) Relaxation
Attention Control
(Stretching and Wellness Education)

• 1 hour, 2 x /week (12 weeks)

• Sessions include

  **Education**
  – FM knowledge
  – Diet and nutrition
  – Physical and mental health

  **Stretching exercise**
Results

• 92% of participants completed the study

• Attendance:

  77% (Tai Chi)
  70% (Attention control)
Baseline Characteristics (N=66)

<table>
<thead>
<tr>
<th></th>
<th>Tai Chi (n=33)</th>
<th>Control (n=33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Female</td>
<td>85%</td>
<td>88%</td>
</tr>
<tr>
<td>White</td>
<td>61%</td>
<td>52%</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>34</td>
<td>32</td>
</tr>
<tr>
<td>Duration of Pain (yr)</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>FIQ, (0-100mm)</td>
<td>63</td>
<td>68</td>
</tr>
<tr>
<td>Physician global, (0-10cm)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Patient global, (0-10cm)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>SF-36, PCS, (0-100)</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>Outcome expectation (1-5)</td>
<td>3.7</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Mean weekly Fibromyalgia Impact Questionnaire Scores

- Control: -10.2 (-16.6, -3.7)
- Tai Chi: -28.5 (-34.7, -22.3)

P = 0.0001
## 12 Week Changes in Secondary Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Tai Chi (n=33)</th>
<th>Control (n=33)</th>
<th>P Value*</th>
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</thead>
<tbody>
<tr>
<td>Sleep Quality Score (0-21)</td>
<td>3.6</td>
<td>0.7</td>
<td><strong>0.001</strong></td>
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<tr>
<td>Patient Global Assessment Score (0-10 cm)</td>
<td>2.5</td>
<td>0.6</td>
<td><strong>0.002</strong></td>
</tr>
<tr>
<td>Physician Global Assessment Score (0-10 cm)</td>
<td>1.0</td>
<td>0.02</td>
<td><strong>0.02</strong></td>
</tr>
<tr>
<td>6 Minute Walk Test</td>
<td>60.6</td>
<td>16.3</td>
<td><strong>0.007</strong></td>
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</tbody>
</table>

*Adjusted means difference were compared by including interaction of time and group in mixed model.
### 12 Week Changes in Secondary Outcomes

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<th>Control (n=33)</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SF-36, Physical Component Summary</strong> (0-100)</td>
<td>8.5</td>
<td>1.4</td>
<td><strong>0.001</strong></td>
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<tr>
<td><strong>SF-36, Mental Component Summary</strong> (0-100)</td>
<td>7.7</td>
<td>1.6</td>
<td><strong>0.03</strong></td>
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<tr>
<td><strong>CES-Depression Score</strong> (0-60)</td>
<td>8.1</td>
<td>2.3</td>
<td><strong>0.005</strong></td>
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<td><strong>Self-efficacy Score</strong> (1-10)</td>
<td>1.5</td>
<td>0.5</td>
<td><strong>0.06</strong></td>
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</table>

*Adjusted means difference were compared by including interaction of time and group in mixed model.
Improvements in Secondary Outcomes

\*FIQ = Fibromyalgia Impact Questionnaire, PSQI= Pittsburgh Sleep Quality Index, CES-D= Center for Epidemiology Studies Depression Index, VAS= Visual Analogue Scale, SF-36= Short-Form health survey, PCS= Physical Component Summary, MCS= Mental Component Summary, CPSS= Chronic Pain Self-Efficacy Scale.
Medication Use

• More subjects discontinued medication to treat FM in the Tai Chi group than in the control group

[(Tai Chi group 11/31 (35%) vs. controls 4/26 (15%), P=0.09]
Mary (6 months follow up)

- Continues to practice Tai Chi (5 classes/wk, practice at home)
- Pain relief from fibromyalgia related areas
- More flexibility, range of motion, and strength
- Improved energy
- No headaches in last 2 months
- Anxiety is no longer a problem
- Improved and restful sleep (6-7 hours)
- More positive attitude
- Pain medications reduced: Advil (<1/week)

“My PCP at Lahey Clinic for 7+years is so impressed with my improved condition, on all levels, that she asked me to share this Tai Chi experience with her other Fibromyalgia patients."
Conclusions

- Pain Reduction
- Quality of Life Improvement
- Functional Status Improvement
- Self-efficacy Improvement
- Depression Reduction
- Sleep Quality Improvement

Tai Chi Mind-body Exercise
Tai Chi: Clinical Implications

• Safe and enjoyable exercise with high adherence

• Effective for treatment of chronic pain

• Improves physical function, sleep quality, depression, and quality of life in people with chronic pain syndrome

• Qualified instructors with healing experience are essential