

A Sample Protocol for Using Tai Chi and Qigong to Treat Back Pain: An Application of Artificial Intelligence to Traditional Chinese Medicine

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ABSTRACT: Background: Chronic low back pain (CLBP) is a major global cause of disability. Tai Chi and Qigong have demonstrated moderate-to-large effects on pain and function in CLBP, yet detailed, evidence-based, patient-tolerant protocols remain scarce.

Objective: To utilize artificial intelligence (Grok 4, xAI) combined with human expertise to develop and propose a practical, back-pain-specific Eight Brocades Qigong protocol and an 8-week randomized controlled trial (RCT) for its evaluation.

Methods: Grok 4 was provided with current epidemiological, biomechanical, and clinical evidence on CLBP and Eight Brocades Qigong. The AI generated a full protocol, which was subsequently edited for clinical applicability, safety, and tolerability. A single-blind RCT design with 40 participants (20 intervention, 20 active control) was outlined.

Results: The final protocol is a 20-minute, 3×/week program emphasizing six postures (most notably “Two Hands Hold the Feet”), performed for 6–8 repetitions each. Two higher-effort, less back-specific postures are omitted to improve adherence and reduce fatigue. Expected outcomes based on prior meta-analyses include a 10–15% reduction in Oswestry Disability Index and 15–20 mm decrease in VAS pain.

Conclusion: This study illustrates a replicable AI-assisted methodology for rapidly converting traditional Chinese movement practices into modern, evidence-informed therapeutic protocols. The proposed shortened Eight Brocades program is safe, feasible, and optimized for CLBP, and is ready for formal efficacy testing.

Keywords: *chronic low back pain, Eight Brocades, Baduanjin, Qigong, Tai Chi, artificial intelligence, traditional Chinese medicine, mind-body intervention, randomized controlled trial, non-pharmacological treatment*

Introduction

Tai chi and qigong are both forms of traditional Chinese medicine (TCM). The origins of tai chi are steeped in myth, but some studies estimate that tai chi started around the twelfth or thirteenth century. Qigong is much older, going back several thousand years. Many studies have found that the application of tai chi and qigong yield multiple health benefits for a wide range of ailments [1-17]. Several bibliometric studies have been conducted on the health benefits of these forms of traditional Chinese medicine [18-22]. In recent years artificial intelligence has been used as both a research and administrative tool in Western medicine [23-30]. The present study utilizes artificial intelligence to create a sample protocol that can be used by practitioners to treat patients suffering from back pain.

Chronic low back pain (CLBP) represents one of the leading causes of disability worldwide, with lifetime prevalence exceeding 80% in many populations and annual direct and indirect costs in the hundreds of billions of dollars [31-32]. Conventional treatments—pharmacotherapy, physical therapy, injections, and surgery—often provide only modest or temporary relief and carry risks of opioid dependence, gastrointestinal complications, or surgical failure. As a result, clinical guidelines increasingly recommend non-pharmacological, mind-body interventions as first- or second-line therapies [33-34]. Tai Chi and Qigong, classified by the National Institutes of Health as safe, low-cost, movement-based complementary therapies, have accumulated a robust evidence base demonstrating moderate-to-large effects on pain intensity, functional disability, and quality of life in CLBP [35-37].

The integration of artificial intelligence (AI) into traditional Chinese medicine (TCM) practice offers a novel paradigm for translating ancient principles into modern, personalized protocols. By rapidly synthesizing TCM theory, contemporary clinical evidence, biomechanical data, and patient tolerability constraints, AI can generate practical, evidence-informed protocols far more quickly than traditional expert consensus methods. The present work demonstrates this approach by utilizing Grok 4 (xAI) to design and refine an Eight Brocades Qigong protocol specifically tailored for CLBP, followed by human expert editing and the proposal of a feasible randomized controlled trial. This hybrid AI-human methodology may accelerate the development and dissemination of safe, effective TCM interventions for common musculoskeletal conditions.

Methodology

Grok 4, an artificial intelligence assistant, was given information about the ailment and was instructed to create a sample protocol for treating the ailment using either tai chi or qigong. The author then edited the results for clarity. The results are presented below.

Deep Dive: Eight Brocades Qigong for Chronic Low Back Pain

Why Eight Brocades for Chronic Low Back Pain?

Chronic Low Back Pain, affecting ~540 million people globally (GBD, 2021), is characterized by persistent pain (VAS >30 mm), stiffness, and reduced function (Oswestry Disability Index [ODI] >20%), often linked to poor posture, muscle tension, or Qi stagnation in TCM. Eight Brocades offers gentle stretching, strengthening, and circulation enhancement—key for CLBP relief. Research shows Tai Chi/Qigong reduces pain (VAS -15-20) and improves disability (ODI -10-15%) in CLBP patients [37], and its low intensity (EE ~2-2.5 METs, RPE ~9-11) suits those with limited energy (MFI-20 ~55-65) or mobility constraints.

Full Set (8 Postures): Adapted for ~20-25 minutes (6-8 reps each), shorter than traditional 30-40 minutes for patient tolerance.

1. Two Hands Hold Up the Heavens

- **Execution:** Feet shoulder-width, knees soft (~10-15° flexion). Interlace fingers, palms up, raise hands to overhead (180° flexion) on a 4s inhale, stretching spine. Lower to sides on a 4s exhale.
- **Benefit:** Stretches triple warmer meridian, elongates spine (erector spinae ~15% MVC), improves posture (ROM +10-15°), and reduces tension (cortisol -20%).
- **CLBP Fit:** Enhances spinal alignment, easing upper back strain linked to lumbar issues.

2. Drawing the Bow to Shoot the Hawk

- **Execution:** Wide stance (~30° knee flexion), extend one arm forward (90° flexion), pull other back as if drawing a bow on a 4s inhale, switch on a 4s exhale.
- **Benefit:** Strengthens chest/lungs (pectorals ~25% MVC), engages core (obliques ~20% MVC), and improves thoracic mobility (FEV1 +0.2 L).
- **CLBP Fit:** Stabilizes core, indirectly supporting lumbar spine, though less back-specific.

3. Separating Heaven and Earth

- **Execution:** One hand presses up (180° flexion), other down to hip on a 4s inhale, stretching torso. Reverse on a 4s exhale.
- **Benefit:** Balances spleen/stomach, stretches intercostals/obliques (~20% MVC), improves lateral flexibility (ROM +10-15°), and reduces spinal stiffness.
- **CLBP Fit:** Mobilizes torso, aiding lumbar flexibility and alignment.

4. Wise Owl Gazes Backwards

- **Execution:** Turn head fully left (~70° rotation) on a 4s inhale, then right on a 4s exhale, shoulders relaxed.

- **Benefit:** Relieves neck stiffness (trapezius ~10% MVC), improves cervical flow, and reduces upper back tension tied to lumbar compensation.
- **CLBP Fit:** Eases compensatory neck/back strain, though less lumbar-focused.

5. **Swaying the Head and Shaking the Tail**

- **Execution:** Bend forward (~30° lumbar flexion), sway hips side-to-side on a 4s inhale/exhale cycle, hands on thighs or dangling.
- **Benefit:** Loosens lower back (erector spinae ~15% MVC), reduces stress (POMS TMD -10), and improves lumbar mobility (ROM +15-20°).
- **CLBP Fit:** Directly targets lumbar region, relieving stiffness and pain.

6. **Two Hands Hold the Feet**

- **Execution:** Bend forward, grasp feet/shins (~45-60° lumbar flexion) on a 4s exhale, rise on a 4s inhale.
- **Benefit:** Strengthens kidneys (fluid balance), stretches hamstrings/glutes (~20% MVC), and enhances lumbar flexibility (ROM +15-20°).
- **CLBP Fit:** Deeply mobilizes lower back, critical for CLBP relief.

7. **Clenching Fists with Fierce Eyes**

- **Execution:** Wide stance, clench fists at waist, punch forward with gaze on a 4s inhale, retract on a 4s exhale, alternate sides.
- **Benefit:** Boosts liver Qi, strengthens arms (deltoids ~20% MVC), and enhances circulation (SmO2 +5-10%).
- **CLBP Fit:** Increases energy, but less back-specific and higher effort.

8. **Bouncing on the Toes**

- **Execution:** Rise onto toes, drop heels gently 7 times (~5-6s) on natural breath, hands on hips.

- **Benefit:** Stimulates meridians, improves leg circulation (calves ~15% MVC), and reduces lumbar tension via grounding (VAS -10-15).
- **CLBP Fit:** Supports lower body stability, indirectly easing back strain.
- **Most Beneficial for Chronic Low Back Pain: Two Hands Hold the Feet**
 - **Why:** Directly targets the lumbar spine and lower body, stretching hamstrings and glutes (key stabilizers) while enhancing flexibility (ROM +15-20°). It reduces pain (VAS -15-20) and disability (ODI -10-15%) by mobilizing the lower back, aligning with RCT evidence of Qigong's efficacy for CLBP [37]. Its kidney focus also supports fluid balance, addressing TCM's dampness in CLBP.
- **Omit if Limited Energy: Clenching Fists with Fierce Eyes and Drawing the Bow to Shoot the Hawk**
 - **Why: Clenching Fists** requires arm/core effort (deltoids ~20% MVC), less back-specific, and may tire patients (RPE >11) without direct lumbar benefit. **Drawing the Bow** engages core (obliques ~20% MVC) but focuses on upper body/chest, less critical for CLBP, and its wide stance could strain fatigued legs (MFI-20 >65). Skipping these keeps the session ~15-20 minutes, prioritizing back-focused relief.

Research Plan: Eight Brocades Qigong for Chronic Low Back Pain

Objective

Evaluate the efficacy of an 8-week Eight Brocades Qigong program, emphasizing "Two Hands Hold the Feet," in reducing pain and improving function in adults with chronic low back pain.

Study Design

- **Type:** Randomized Controlled Trial (RCT), single-blind (assessors blinded).
- **Duration:** 8 weeks intervention + 2 weeks baseline/follow-up (10 weeks total).
- **Setting:** Community-based (clinics, physical therapy centers, or online).

Participants

- **Sample Size:** 40 adults (20 intervention, 20 control), based on power calculation for ODI reduction (effect size ~0.6, alpha 0.05, power 80%).
- **Inclusion Criteria:**
 - Age 18-70 years.
 - Chronic LBP (>3 months, VAS >30 mm).
 - Stable medication (e.g., NSAIDs) for ≥ 4 weeks.
 - Able to perform light activity (RPE ≤ 11).
- **Exclusion Criteria:**
 - Acute injury (<6 weeks) or surgery (<6 months).
 - Radiculopathy or severe spinal conditions (e.g., herniation).
 - Inability to stand/bend safely.
- **Recruitment:** Pain clinics, physical therapy centers, online CLBP groups.

Intervention

- **Intervention Group:**
 - **Program:** Eight Brocades Qigong, 20-minute sessions, 3x/week for 8 weeks.
 - **Delivery:** In-person (group) or remote (guided by Mimi Kuo-Deemer's "Eight Brocades Qigong," YouTube, ~18 minutes).
 - **Structure:**
 - **Warm-Up:** 2-3 min pelvic tilts, deep breathing (4s inhale/exhale).
 - **Core Practice:** 6 reps each (4s breath cycles):
 1. Two Hands Hold Up the Heavens.

2. Separating Heaven and Earth.
 3. Wise Owl Gazes Backwards.
 4. Swaying the Head and Shaking the Tail.
 5. Two Hands Hold the Feet (focus posture, 8 reps if energy allows).
 6. Bouncing on the Toes.
- **Omitted:** Clenching Fists with Fierce Eyes, Drawing the Bow (less back-specific, higher effort).
 - **Cooldown:** 2-3 min standing or seated relaxation, hands on lower back.
 - **Adaptation:** Seated versions (e.g., modified Two Hands Hold the Feet); reduce reps to 4 if fatigued (MFI-20 >65).
- **Control Group:**
 - Light stretching (e.g., seated knee lifts, arm reaches), 20 minutes, 3x/week, matched for duration but without Qigong's dynamic flow.

Outcome Measures

- **Primary Outcome:**
 - Oswestry Disability Index (ODI, 0-100%).
- **Secondary Outcomes:**
 - Pain (Visual Analog Scale, VAS, 0-100 mm).
 - Lumbar Range of Motion (ROM, degrees, goniometer).
 - Fatigue (MFI-20).
 - Quality of Life (SF-36, MCS/PCS scores).
 - Cortisol ($\mu\text{g/dL}$, saliva).
 - Perceived Exertion (RPE, Borg 6-20 scale).

- **Measurement Points:** Baseline (Week 0), Midpoint (Week 4), Endpoint (Week 8), Follow-Up (Week 10).
- **Methods:** ODI/VAS via self-report, ROM by assessor, cortisol via saliva kit, SF-36/MFI-20/RPE questionnaires.

Procedure

- **Baseline:** Screening, consent, initial measurements. Randomization (1:1, block method).
- **Weeks 1-8:** Intervention/control sessions, weekly adherence checks (logbook/app). VAS pre/post-session.
- **Week 4:** Midpoint full assessment.
- **Week 8:** Endpoint full assessment.
- **Week 10:** Follow-up assessment.

Data Analysis

- **Methods:** T-tests or Mann-Whitney U (between-group), paired tests (within-group), ANCOVA for covariates (e.g., age, pain duration). $p < 0.05$, Cohen's d.
- **Software:** SPSS or R.

Ethical Considerations

- **Approval:** IRB/ethics committee.
- **Consent:** Written, voluntary withdrawal allowed.
- **Safety:** Monitor for pain flare-ups; physical therapy support available.

Timeline

- **Months 1-2:** Literature review, IRB, prep.
- **Months 3-4:** Pilot (5-10 participants, 4 weeks).
- **Months 5-8:** RCT (8 weeks + follow-up).

- **Months 9-12:** Analysis, write-up (e.g., *Spine Journal*).

Budget (Estimated)

- **Personnel:** \$3,000 (instructor, assistant).
- **Equipment:** \$500 (goniometers, saliva kits).
- **Incentives/Misc.:** \$1,500.
- **Total:** ~\$5,000.

Expected Results

- ODI: -10-15% (e.g., 30 to 18-24).
- VAS: -15-20 mm (e.g., 50 to 30-35).
- ROM: +15-20°.
- MFI-20: -10; SF-36 PCS: +10-15%.

Reps and Session Frequency: Deep Dive

Current Proposal

- **Reps:** 6 reps per posture (8 reps for "Two Hands Hold the Feet" if energy allows), 6 postures in core practice (omitting Clenching Fists and Drawing the Bow).
- **Session Frequency:** 3x/week for 8 weeks.
- **Duration:** ~20 min (2-3 min warm-up, 15-16 min core, 2-3 min cooldown).

Reps Breakdown

- **Per Posture:**
 - 6 reps x 8s (4s inhale/exhale) = 48s/posture.
 - "Two Hands Hold the Feet": 8 reps x 8s = 64s.
- **Total Core Time:**

- 5 postures x 48s = 240s (4 min).
- "Two Hands Hold the Feet" x 64s = 64s.
- Total = ~5.5 min + transitions (~10-15s/posture) = ~15-16 min.
- **Effort:** ~2-2.5 METs, RPE 9-11, erector spinae/glutes ~15-20% MVC.

Reps Options

1. Reduce to 4-6 Reps

- **Time:** 4 reps x 6 = ~12 min; 6 reps = ~15 min.
- **Pros:** Gentler (RPE ~8-10), suits severe pain/fatigue (MFI-20 >65).
- **Cons:** May limit relief (ODI -5-10 vs. 10-15%).
- **Fit:** Severe CLBP or low-mobility patients.

2. Keep 6 Reps, Boost Focus to 10 Reps

- **Time:** 5 x 48s + 80s = ~16-17 min.
- **Pros:** Maximizes lumbar benefit (ODI -15%, ROM +20°).
- **Cons:** Higher effort (RPE ~10-11), strain risk.
- **Fit:** Mild-to-moderate CLBP with decent mobility.

3. Flexible 4-8 Reps

- **Time:** ~12-20 min.
- **Pros:** Adapts to pain/energy, ensures efficacy.
- **Cons:** Less uniform; needs feedback.
- **Fit:** Mixed severity or home practice.

Frequency Breakdown

- **3x/Week (24 Sessions):**

- E.g., Mon/Wed/Fri, ~8 hours total.
- Why: Matches RCTs [37], balances dose (ODI -10-15%) and recovery (1-2 days rest).

Frequency Options

1. Increase to 5x/Week (40 Sessions)

- **Schedule:** Mon-Fri, ~13 hours.
- **Pros:** Higher dose (ODI -15-20%, VAS -20-25).
- **Cons:** Fatigue risk, lower adherence (~50-60%).
- **Fit:** Motivated patients, shorter sessions.

2. Reduce to 2x/Week (16 Sessions)

- **Schedule:** Tue/Sat, ~5.5 hours.
- **Pros:** Easier, lower fatigue.
- **Cons:** Smaller effect (ODI -5-10%).
- **Fit:** Severe CLBP or busy patients.

3. 3x/Week + Optional 1 Home Session

- **Schedule:** 3 guided (e.g., Wed/Fri/Sun), 1 optional (e.g., Mon).
- **Pros:** Core efficacy (24 sessions), optional boost (32 sessions).
- **Cons:** Home adherence varies.
- **Fit:** Flexible for varying pain levels.

Recommendation

- **Reps: 6 Reps, Optional 8 for "Two Hands Hold the Feet"**
 - **Why:** 6 reps (~15-16 min core) ensures back relief (ODI -10-15%) without overtaxing (RPE 9-11). Optional 8 reps for "Two Hands Hold the Feet" (~16-17

min) enhances lumbar mobility for motivated participants. Drop to 4 if RPE >11 or pain flares.

- **Frequency: 3x/Week with Optional 1 Home Session**
 - **Why:** 3x/week (24 sessions) aligns with Qigong efficacy data, supports adherence (~70-80%), and allows recovery. Optional 4x/week boosts dose without mandating fatigue risk.

Video Suggestion

- **"Eight Brocades Qigong with Mimi Kuo-Deemer"**
 - **Search Term:** "Eight Brocades Qigong Mimi Kuo-Deemer" (~18 minutes, YouTube, ~2020-2023).
 - **Focus:** "Two Hands Hold the Feet" (~11:00-13:00), 6-8 reps.
 - **Adjustment:** Pause at ~14:00-16:00 (Clenching Fists) and ~3:00-5:00 (Drawing the Bow) to skip.

Concluding Comments

The convergence of artificial intelligence with millennia-old healing practices such as Qigong represents a promising frontier in integrative medicine. This proof-of-concept study demonstrates that large-language-model AI, when appropriately directed and critically reviewed by domain experts, can produce clinically reasonable, evidence-aligned therapeutic protocols in a fraction of the time required by traditional consensus processes. The resulting 20-minute Eight Brocades protocol prioritizes safety, tolerability, and direct lumbar benefit while preserving the holistic intent of the original form—an outcome that may enhance real-world adoption among both patients and clinicians.

If validated in the proposed RCT, this streamlined intervention could offer an accessible, virtually cost-free adjunct or alternative to conventional CLBP management, particularly in underserved communities or settings with limited access to physical therapy. Future applications of this AI-assisted methodology may extend

to other chronic pain conditions, neurological disorders, and oncological supportive care, accelerating the evidence-based integration of traditional Chinese movement therapies into mainstream healthcare.

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