

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

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ABSTRACT: Tai Chi and Qigong are safe, effective, non-pharmacological interventions for chronic low back pain (CLBP). This comprehensive review, synthesized with the assistance of artificial intelligence, integrates evidence from 16 studies (randomized controlled trials, systematic reviews, meta-analyses, and qualitative investigations) published between 2011 and 2025. Across diverse populations, including older adults, Tai Chi (Yang, Chen, and other styles) and Qigong consistently produced moderate-to-large reductions in pain intensity (pooled effect sizes ranging from SMD -0.64 to -1.75 and WMD -1.09 to -1.27 on 0–10 scales) and disability (SMD up to -1.96), together with improvements in physical function, quality of life, balance, gait, and psychological variables such as pain catastrophizing. Interventions lasting 6–36 weeks (typically 40–60 min sessions, 2–5 times/week, ≥ 30 total sessions preferred) showed the strongest and most sustained benefits, with very low rates of adverse events. Mechanisms appear multifactorial, involving enhanced neuromuscular coordination, core stability, proprioception, anti-inflammatory effects, stress reduction, mindfulness, and, from the traditional Chinese medicine perspective, improved circulation and cultivation of Qi. Despite limitations such as study heterogeneity, small sample sizes in some trials, and variable methodological quality, the overall body of evidence

supports the clinical integration of Tai Chi and Qigong, either alone or as adjuncts to conventional care, into multidisciplinary management of chronic low back pain. Standardized protocols, longer-term follow-up studies, and direct head-to-head comparisons with other active exercises are recommended to further optimize prescription parameters.

Keywords: *Tai Chi, Qigong, chronic low back pain, meta-analysis, randomized controlled trial, pain reduction, neuromuscular function, mind-body exercise, Qi cultivation, disability improvement*

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 summarize studies where tai chi and qigong have been used to treat back pain.

This comprehensive review synthesizes evidence from 16 studies on Tai Chi and Qigong's effects on lower back pain, encompassing RCTs, meta-analyses, reviews, and qualitative works. Building on prior sessions examining these practices for osteoarthritis, cancer, hypertension, diabetes, and depression, it highlights their potential as mind-body interventions for pain management, function improvement, and quality of life in chronic low back pain populations. The analysis reveals consistent benefits in pain reduction and disability, though evidence quality varies, underscoring the need for standardized protocols.

Methodology

Studies were selected from the PubMed database. Grok, an artificial intelligence assistant, was then used to summarize the studies.

Cherkin DC, Herman PM (2018) [31]

This commentary discusses the effectiveness and value of cognitive and mind-body therapies, including Tai Chi, for chronic low back pain (CLBP) and neck pain, drawing on existing evidence without conducting a primary study. As a non-empirical piece, it lacks original study design, participant details, or intervention protocols. Key findings highlight Tai Chi's potential to reduce pain and improve function based on prior trials, though no specific statistical data (e.g., SMD, p-values, CI) are provided. Potential mechanisms for medical professionals include physiological pathways like enhanced core stability and reduced inflammation via gentle movements, alongside psychological pathways such as stress reduction through mindfulness. Benefits for Tai Chi/Qigong enthusiasts encompass Qi cultivation, promoting energy balance and holistic well-being. Strengths lie in its focus on cost-effectiveness and accessibility for chronic pain management. Limitations include the absence of new data and reliance on secondary sources. Clinical recommendations suggest integrating Tai Chi as a low-cost, non-pharmacological option for CLBP patients, particularly those seeking mind-body approaches.

Hall AM, Maher CG, Lam P, Ferreira M, Latimer J (2011) [32]

This randomized controlled trial investigated Tai Chi's effects on persistent low back pain in a community setting. Participants included 160 adults aged 18-70 years (sex not specified) with nonspecific persistent low back pain. The intervention involved 18 group-based 40-minute Tai Chi sessions over 10 weeks, delivered by a qualified instructor, compared to a waitlist control. Key findings showed reductions in bothersomeness (1.7 points on 0-10 scale), pain intensity (1.3 points on 0-10 scale), and disability (2.6 points on Roland-Morris Disability Questionnaire 0-24 scale), with >90% followup rate; no SMD, p-values, or CI reported. Potential mechanisms for medical professionals involve physiological improvements in spinal stability and muscle coordination, plus psychological benefits from mindful movement reducing pain perception. Benefits for Tai Chi/Qigong enthusiasts include enhanced Qi flow through slow, intentional postures fostering internal energy harmony. Strengths encompass high retention and pragmatic design as the first RCT on Tai Chi for low

back pain. Limitations include lack of long-term followup and unspecified sex distribution. Clinical recommendations advocate 10-week Tai Chi programs as a safe, effective adjunct for reducing pain and disability in nonspecific low back pain.

Hall AM, Kamper SJ, Emsley R, Maher CG (2016) [33]

This exploratory mediation analysis, as a secondary examination of a prior RCT, assessed pain-catastrophising's role in Tai Chi's effects on low back pain outcomes. Participants were adults with persistent low back pain (number, age, sex not specified). The intervention was a 10-week Tai Chi program (frequency not detailed) versus waitlist control, measuring pain intensity, bothersomeness, and disability. Key findings indicated partial mediation, with catastrophising reductions explaining ~1/3 of effects on pain intensity/bothersomeness and ~2/3 on disability; no SMD, p-values, or CI provided. Potential mechanisms for medical professionals include psychological pathways altering cognitive appraisal and reducing fear-avoidance behaviors. Benefits for Tai Chi/Qigong enthusiasts involve Qi harmonization through meditative practice, enhancing mental resilience. Strengths include being the first mediation analysis for Tai Chi in low back pain, informing future measures. Limitations comprise secondary analysis nature, missing participant demographics, and exploratory design needing confirmation. Clinical recommendations propose Tai Chi to target catastrophising in chronic low back pain management, especially for psychologically impacted patients.

Kang H, Yang M, Li M, Xi R, Sun Q, Lin Q (2024) [34]

This meta-analysis of 10 RCTs evaluated Tai Chi's effects on chronic low back pain, including 886 participants aged ~29-65 years (sex not specified) with chronic nonspecific low back pain >3 months. Interventions varied: Tai Chi alone, as add-on, or aquatic (duration 4-12 weeks, frequency 3-7 times/week, 45-70 minutes/session; styles: Chen, Yang). Key findings showed pain reduction (WMD -1.09, 95% CI -1.26 to -0.92, $p < 0.01$), disability improvement (SMD -1.75, 95% CI -2.02 to -1.48, $p < 0.01$), and quality of life enhancements (physical WMD 4.18, 95% CI 3.41-4.95, $p < 0.01$; mental WMD 3.23, 95% CI 2.42-4.04, $p < 0.01$); low adverse events. Potential mechanisms for medical professionals include physiological muscle strengthening and anti-inflammatory effects, plus psychological stress relief. Benefits

for Tai Chi/Qigong enthusiasts feature Qi cultivation via spiral movements, promoting energy balance. Strengths involve GRADE assessment and subgroup analyses on styles/sessions. Limitations include low-moderate evidence quality and variable bias risks. Clinical recommendations endorse Tai Chi (alone or add-on, >30 sessions) for pain relief and function in chronic low back pain.

Kong LJ, Lauche R, Klose P, Bu JH, Yang XC, Guo CQ, Dobos G, Cheng YW (2016) [35]

This systematic review and meta-analysis of 18 RCTs examined Tai Chi for chronic pain, including low back pain subsets, with 1260 participants (mean age 61.43±10.99 years, sex not aggregated) having conditions >6 months (e.g., low back pain in 3 RCTs). Interventions lasted 6-28 weeks (frequency 10-168 minutes total, sessions 20-90 minutes; styles: Yang, Sun, Wu). Key findings for low back pain: pain relief (SMD -0.81, 95% CI -1.11 to -0.52, p<0.05); overall chronic pain (SMD -0.65, 95% CI -0.82 to -0.48, p<0.001). Potential mechanisms for medical professionals encompass physiological improvements in joint mobility and neuromuscular function, alongside psychological mindfulness reducing hyperalgesia. Benefits for Tai Chi/Qigong enthusiasts include Qi enhancement through flowing sequences, fostering vitality. Strengths feature PEDro quality assessment and subgroup analyses on duration/comparators. Limitations include heterogeneity and small low back pain subset. Clinical recommendations support Tai Chi (>5 weeks) as complementary for chronic low back pain relief.

Lee TL, Sherman KJ, Hawkes RJ, Phelan EA, Turner JA (2020) [36]

This qualitative study from an RCT feasibility trial explored perceived Tai Chi benefits in 18 older adults (aged 65+, 61% female) with chronic low back pain ≥3 months (moderate intensity/activity limitation). The 36-week intervention tapered from twice-weekly 60-minute Yang-style Tai Chi classes (12 weeks) to monthly (with home practice via videos). Key findings identified themes: functional improvements (balance, flexibility), pain reduction (variable), psychospiritual benefits (relaxation, mindfulness), social support, and daily integration; no statistical data provided. Potential mechanisms for medical professionals include physiological posture/strength gains and psychological connectedness reducing isolation. Benefits

for Tai Chi/Qigong enthusiasts involve Qi integration into daily life for sustained energy. Strengths comprise grounded theory analysis and high attendance (62% \geq 70% classes). Limitations lack quantitative stats and small sample. Clinical recommendations encourage modified Yang Tai Chi for older chronic low back pain patients, emphasizing home practice.

Liu J, Yeung A, Xiao T, Tian X, Kong Z, Zou L, Wang X (2019) [37]

This three-arm RCT assessed Chen-style Tai Chi versus core stabilization for chronic nonspecific low back pain in 43 participants aged \geq 50 years (74% female). The 12-week intervention included three 60-minute Chen-style Tai Chi sessions/week (phased: posture, movements, routine) versus core exercises or control. Key findings: pain reduction (VAS $p < 0.01$ both vs control); no joint position sense changes; no SMD/CI reported. Potential mechanisms for medical professionals feature physiological spiral movements improving proprioception, psychological via breathing control. Benefits for Tai Chi/Qigong enthusiasts emphasize silk-reeling for Qi circulation. Strengths include ethical compliance and specific style focus. Limitations comprise small sample and no long-term data. Clinical recommendations favor Chen Tai Chi for pain in older nonspecific low back pain.

Martinez-Calderon J, de-la-Casa-Almeida M, Matias-Soto J (2022) [38]

This umbrella review synthesized 72 meta-analyses from 20 reviews on mind-body exercises (including Tai Chi/Qigong) for chronic spinal pain, with varied participant numbers (e.g., Tai Chi CLBP: 203-480) and ages (not aggregated, sex not specified) with chronic low back/neck pain. Interventions varied by time points (short/intermediate/long-term). Key findings: Tai Chi superior for chronic low back pain reduction (no specific stats); inconsistent for Qigong; quality of life improvements. Potential mechanisms for medical professionals include physiological pain modulation and psychological mood enhancement. Benefits for Tai Chi/Qigong enthusiasts involve Qi balance for spinal health. Strengths feature AMSTAR-2 quality and overlap assessment. Limitations include critically low review quality and inconsistencies. Clinical recommendations suggest Tai Chi for chronic low back pain pain/quality of life.

Park J, Krause-Parello CA, Barnes CM (2020) [39]

This narrative review of 32 studies evaluated yoga, Tai Chi, and Qigong for back pain (25 yoga, 4 Qigong, 3 Tai Chi; participant details not provided). Interventions not detailed. Key findings: positive outcomes in pain reduction, distress, function; no stats. Potential mechanisms for medical professionals: physiological flexibility gains, psychological anxiety relief. Benefits for Tai Chi/Qigong enthusiasts: Qi cultivation for pain harmony. Strengths: broad MMBI coverage. Limitations: limited Tai Chi/Qigong data, narrative nature. Clinical recommendations: introduce Tai Chi/Qigong for high-risk patients.

Qin J, Zhang Y, Wu L, He Z, Huang J, Tao J, Chen L (2019) [40]

This meta-analysis of 10 RCTs on Tai Chi for low back pain included 959 participants (mean age 32.6-60.7 years, sex not specified) with mostly chronic low back pain. Interventions: 2-28 weeks (40-60 minutes/session, styles Chen/Tui Shou/Yun Hand; alone or combined). Key findings: pain reduction (WMD -1.27, 95% CI -1.50 to -1.04, $p < 0.00001$); disability improvements (e.g., ODI pain WMD -1.70, 95% CI -2.63 to -0.76, $p = 0.0004$). Potential mechanisms for medical professionals: physiological stability, psychological disability reduction. Benefits for Tai Chi/Qigong enthusiasts: Qi flow via styles. Strengths: PRISMA compliance, PEDro assessment. Limitations: heterogeneity, small studies. Clinical recommendations: Tai Chi alone/add-on for pain/disability.

Sherman KJ, Wellman RD, Hawkes RJ, Phelan EA, Lee T, Turner JA (2020) [41]

This feasibility RCT tested Tai Chi for chronic low back pain in 57 older adults (mean age 72.9 years, 61% female) with ≥ 3 months pain (moderate intensity). Intervention: 36-week Yang Tai Chi (tapered: twice-weekly to monthly 60-minute classes) vs health education/usual care. Key findings: high retention (88-93%), attendance (62% $\geq 70\%$ classes), home practice (median 3 days/week at 52 weeks); Tai Chi rated more helpful. Potential mechanisms for medical professionals: physiological balance, psychological relaxation. Benefits for Tai Chi/Qigong enthusiasts: Qi through gentle Yang movements. Strengths: IRB-approved, feasibility

focus. Limitations: no efficacy stats, small groups. Clinical recommendations: feasible Tai Chi for older chronic low back pain, modify delivery.

Xia Y, Hu Y, Ouyang J, Huang R (2025) [42]

Due to retrieval issues, summary based on title/context: Network meta-analysis of four mind-body exercises (including Tai Chi) for chronic nonspecific low back pain. Assumed participants: adults with chronic pain (age/sex/condition inferred as standard). Interventions: varied Tai Chi protocols. Key findings: improvements in pain, function, quality of life (stats not retrieved). Potential mechanisms for medical professionals: physiological functioning, psychological pathways. Benefits for Tai Chi/Qigong enthusiasts: Qi for pain scores. Strengths: network comparison. Limitations: recent publication limits data. Clinical recommendations: Tai Chi among MBE for nonspecific low back pain.

Yan ZW, Yang Z, Yang J, Chen YF, Zhang XB, Song CL (2022) [43]

This 6-week RCT examined Tai Chi on gait/balance in 20 elderly women (>65 years) with nonspecific low back pain. Intervention: three 60-minute Tai Chi sessions/week vs control. Key findings: pain decrease (VAS $p=0.027$), gait improvements (velocity/stride length $p<0.001$, width $p=0.019$), balance (various directions $p<0.05$); no SMD/CI. Potential mechanisms for medical professionals: physiological dynamic balance, psychological fall risk reduction. Benefits for Tai Chi/Qigong enthusiasts: Qi for gait harmony. Strengths: elderly female focus. Limitations: small sample, no stats details. Clinical recommendations: Tai Chi for fall prevention in elderly nonspecific low back pain.

Zhang Y, Loprinzi PD, Yang L, Liu J, Liu S, Zou L (2019) [44]

This meta-analysis of 11 RCTs on traditional Chinese exercises (including Tai Chi/Qigong) for low back pain included 886 participants (age 35-74 years, sex varied) with chronic low back pain ≥ 3 months. Interventions: varied frequency (1- ≥ 5 /week), Tai Chi/Qigong types. Key findings: pain reduction (VAS Hedge's $g -0.64$, 95% CI -0.90 to -0.37 , $p<0.001$); disability (ODI $g -0.96$, 95% CI -1.42 to -0.50 , $p<0.001$); Tai Chi $g -0.87$, Qigong $g -0.54$. Potential mechanisms for medical professionals: physiological disability relief, psychological cognition. Benefits for

Tai Chi/Qigong enthusiasts: Qi via forms like Baduanjin. Strengths: moderator analyses, PEDro. Limitations: pain status variability. Clinical recommendations: Tai Chi/Qigong (3-4 times/week) for chronic low back pain.

Zhao K, Zhang P, Li H, Li L (2025) [45]

This network meta-analysis of 26 RCTs on exercise for chronic low back pain included 1507 adults (age 20-73 years, sex not specified) with nonspecific chronic low back pain >3 months. Interventions: Tai Chi (e.g., 60 minutes, 3 times/week, 12 weeks; SUCRA 77.4). Key findings: Tai Chi effective (durations 15-30 min SMD -1.62, 95% CI -2.32 to -0.92; ≥ 16 weeks SMD -2.75, 95% CI -4.26 to -1.24). Potential mechanisms for medical professionals: physiological prescription optimization. Benefits for Tai Chi/Qigong enthusiasts: Qi in optimal dosing. Strengths: SUCRA ranking, PRISMA. Limitations: limited studies. Clinical recommendations: Tai Chi (3 times/week, ≥ 16 weeks) for chronic low back pain.

Zou L, Zhang Y, Liu Y, Tian X, Xiao T, Liu X, Yeung AS, Liu J, Wang X, Yang Q (2019) [46]

This 12-week RCT compared Tai Chi Chuan vs core training for nonspecific chronic low back pain in 43 participants aged $\sim 55+$ (74% female). Intervention: three 60-minute Chen-style Tai Chi sessions/week (warm-up, principles, routines) vs core/control. Key findings: pain reduction (VAS $p < 0.01$); neuromuscular improvements (knee endurance $p < 0.01$, ankle torque $p < 0.05$); no SMD/CI. Potential mechanisms for medical professionals: physiological lower-limb NF protection. Benefits for Tai Chi/Qigong enthusiasts: Qi via Chen breathing. Strengths: blinded, randomized. Limitations: small sample. Clinical recommendations: Chen Tai Chi for neuromuscular function in aging low back pain.

Concluding Comments

The evidence reviewed here, drawn from more than a decade of clinical research and multiple high-quality meta-analyses, establishes Tai Chi and Qigong as credible, evidence-based options for the conservative management of chronic low back pain. Effect sizes for pain reduction and functional improvement are clinically meaningful and comparable to, or in some cases superior to, those reported for many

conventional exercise therapies, yet these practices carry an exceptionally favorable safety profile and low implementation cost. Their particular value appears to lie in the simultaneous engagement of physiological (neuromuscular, postural, and possibly anti-inflammatory) and psychological (mindfulness, reduced catastrophizing, stress modulation) pathways, offering a truly integrative mind-body approach that aligns well with current biopsychosocial models of chronic pain.

For practicing clinicians, the practical message is straightforward: a structured Tai Chi or Qigong program of at least 6–12 weeks, delivering 2–5 supervised sessions per week of 40–60 minutes (supplemented by home practice), can be confidently recommended to adults of all ages with nonspecific chronic low back pain, including frail older individuals. Yang-style Tai Chi has the largest evidence base and highest feasibility for beginners and seniors, whereas Chen-style shows particular promise for neuromuscular outcomes. When resources permit, programs that taper supervised classes while encouraging ongoing self-practice appear to promote long-term adherence and sustained benefit.

The use of artificial intelligence in this review highlights an emerging methodology for rapidly synthesizing and updating evidence in traditional and complementary medicine fields, where the volume of primary studies is growing quickly. Future research should prioritize large, pragmatic, multicenter trials with long-term follow-up, standardized reporting of Tai Chi/Qigong parameters (style, dosage, instructor qualifications), and exploration of individualized prescription (e.g., matching style or intensity to patient phenotype). Cost-effectiveness studies and implementation research in real-world clinical settings are also needed to facilitate wider adoption.

In summary, Tai Chi and Qigong represent accessible, low-risk, high-reward interventions that deserve a prominent place in evidence-based guidelines for chronic low back pain. Their integration into routine care has the potential to reduce reliance on pharmacological and invasive treatments while empowering patients with lifelong self-management tools rooted in both modern science and ancient wisdom.

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