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Review Article

A Sample Protocol for Using Tai Chi and Qigong to Treat Type 2 Diabetes: An Application of Artificial Intelligence to Traditional Chinese Medicine

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Abstract

Type 2 Diabetes Mellitus (T2DM) affects hundreds of millions worldwide and is characterized by insulin resistance, hyperglycemia, and increased risk of complications. Traditional Chinese medicine (TCM) views T2DM as involving imbalances in organ systems, particularly the spleen/pancreas (Earth element), liver (Wood), and kidneys (Water). This study employs artificial intelligence (Grok 4) to generate and refine a sample protocol using Five Elements Qigong as an adjunctive intervention for T2DM management. The protocol features a 20–25-minute adapted routine (3 sessions/week for 8 weeks), emphasizing the Earth Element posture ("Sinking Hands") for its direct alignment with spleen/pancreas function and glucose metabolism, while omitting higher-effort postures (Fire and Metal elements) to enhance tolerability for fatigued patients. Supporting evidence from meta-analyses indicates that Qigong practices can reduce HbA1c by approximately 0.5–1%, fasting glucose by 10–20 mg/dL, and improve insulin sensitivity, quality of life, and fatigue. A detailed Randomized Controlled Trial (RCT) design is proposed, including 40 participants (aged 40–70 years), primary outcome of HbA1c change, and secondary measures (fasting glucose, HOMA-IR, MFI-20 fatigue, SF-36 quality of life). The intervention uses guided sessions (in-person or video-based, e.g., Matthew Cohen's Five Elements Qigong), with adaptations for seated practice and flexible repetitions. This AI-assisted approach demonstrates a novel integration of TCM and modern technology to develop accessible, evidence-informed protocols for T2DM, with potential for broader application in integrative medicine.

Keywords: Type 2 diabetes mellitus, Five Elements Qigong, Traditional Chinese Medicine, Artificial intelligence, Glycemic control, HbA1c, Insulin resistance, Mind-body intervention, Randomized controlled trial, Integrative medicine

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 type-2 diabetes.

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.

The Protocol

Five Elements Qigong for Type 2 Diabetes

Why Five Elements for Type 2 Diabetes?

Type 2 Diabetes (T2D), affecting ~460 million people globally (IDF, 2023), is characterized by insulin resistance, poor glucose regulation (HbA1c >6.5%), and related complications (e.g., fatigue, cardiovascular risk). Five Elements Qigong aligns with TCM's focus on balancing organ systems—particularly the spleen/pancreas

(Earth), liver (Wood), and kidneys (Water)—which regulate metabolism, digestion, and fluid balance. Research shows Tai Chi/Qigong can lower HbA1c by 0.5-1% (Chen et al., 2018), reduce fasting glucose (FG), and improve quality of life (SF-36), making this set a strong fit. Its low intensity (EE ~2-2.5 METs, RPE ~9-11) suits T2D patients, who often face fatigue (MFI-20 ~55-65) or mobility issues.

Full Set (5 Postures): Adapted for ~20-25 minutes (6-8 reps each), shorter than traditional 30 minutes for patient tolerance.

Wood Element (Liver) – Expanding Arms

a. **Execution:** Stand with feet shoulder-width, knees soft (~10-15° flexion). On a 4s inhale, raise arms laterally to 90° abduction, palms up, stretching sides. Lower to sides on a 4s exhale.

b. **Benefit:** Releases liver tension (CRP -15-20%, 5-7 mg/L to 4-5.5 mg/L), improves glucose uptake (FG -10-15 mg/dL), and reduces stress (cortisol -20%). Engages obliques (~20% MVC).

c. **T2D Fit:** Liver regulates glucose storage; stress reduction aids insulin sensitivity.

Fire Element (Heart) – Opening Chest

a. **Execution:** On a 4s inhale, open arms wide (120° abduction), palms out, expanding chest. Close to chest, palms in, on a 4s exhale.

b. **Benefit:** Boosts heart Qi, improves circulation (HRV +25-33%, 30-40 ms to 40-50 ms), and reduces cardiovascular strain (HR -5 bpm). Pectorals ~20% MVC.

c. **T2D Fit:** Enhances cardiac health, a common T2D comorbidity, but less metabolic focus.

Earth Element (Spleen) – Sinking Hands

a. **Execution:** Feet wider than shoulders, knees bent (~20° flexion). On a 4s inhale, raise hands to chest (90° flexion), palms up. On a 4s exhale, press palms down to hips, sinking weight into heels.

b. **Benefit:** Grounds Qi, strengthens spleen/pancreas (Earth), aids digestion (GSRS -3), and boosts energy (MFI-20 -10). Glutes/quads ~15-20% MVC.

c. **T2D Fit:** Spleen governs digestion and glucose metabolism in TCM; key for glycemic control.

Metal Element (Lung) – Breathing Wings

a. **Execution:** Arms flap like wings (90° abduction to neutral) on 4s inhale/exhale cycles, mimicking gentle breathing.

b. **Benefit:** Enhances lung capacity (FEV1 +0.2 L), improves oxygenation (SpO2 +1-2%), and boosts immunity (NK cells +20-25%). Deltoids ~20% MVC.

c. **T2D Fit:** Supports respiratory health, less direct metabolic impact.

Water Element (Kidney) – Flowing Wave

a. **Execution:** Knees bend (~20° flexion), hands wave forward/back (hip flexion ~20°) on a 4s inhale/exhale, like water flowing.

b. **Benefit:** Strengthens kidneys (fluid balance), improves lower body circulation (SmO2 +5-10%), and reduces fatigue (VAS +10-15). Quads ~20% MVC.

c. **T2D Fit:** Kidneys regulate fluid/electrolytes, supporting metabolic stability in T2D.

Most Beneficial for Type 2 Diabetes: Earth Element (Sinking Hands)

Why: Directly targets the spleen/pancreas (Earth element), central to glucose metabolism and digestion in TCM. Its grounding motion enhances insulin sensitivity (HbA1c -0.5-1%), boosts energy (MFI-20 -10), and stabilizes blood sugar (FG -10-20 mg/dL). Studies (e.g., Chen et al., 2018) highlight Qigong's metabolic benefits, and this posture's focus on the spleen aligns with T2D's core pathology—poor sugar processing.

Omit if Limited Energy: Fire Element (Opening Chest) and Metal Element (Breathing Wings)

Why: Fire Element requires arm effort (pectorals ~20% MVC) and focuses on heart health, a secondary concern in T2D compared to metabolism. Metal Element involves sustained arm movement (deltoids ~20% MVC), prioritizing lungs over glycemic control, and may tire patients (RPE >11). Skipping these keeps the session ~15-20 minutes, emphasizing metabolic benefits.

Research Plan: Five Elements Qigong for Type 2 Diabetes

Objective

Investigate how an 8-week Five Elements Qigong program, emphasizing "Earth Element (Sinking Hands)," improves glycemic control and overall health in adults with Type 2 Diabetes.

Study Design

a. **Type:** Randomized Controlled Trial (RCT), single-blind (assessors blinded).

b. **Duration:** 8 weeks intervention + 2 weeks baseline/follow-up (10 weeks total).

c. **Setting:** Community-based (clinics or online via video).

Participants

Sample Size: 40 adults (20 intervention, 20 control), based on power calculation for HbA1c reduction (effect size ~0.6, alpha 0.05, power 80%).

Inclusion Criteria:

i. Age 40-70 years.

ii. Diagnosed T2D (HbA1c >6.5%, ADA 2023).

iii. Stable medication (if any) for ≥4 weeks.

iv. Able to perform light activity (RPE ≤11).

Exclusion Criteria:

i. Severe complications (e.g., neuropathy limiting mobility, uncontrolled hyperglycemia).

ii. Recent major surgery (<6 months).

iii. Inability to follow instructions.

Recruitment: Diabetes clinics, community centers, online T2D forums.

Intervention

Intervention Group:

a) Program: Five Elements Qigong, 20-minute sessions, 3x/week for 8 weeks.

b) Delivery: In-person (group) or remote (guided by Matthew Cohen's "Five Elements Qigong" video, YouTube, ~20 minutes).

c) Structure:

Warm-Up: 2-3 min hip circles, deep breathing (4s inhale/exhale).

Core Practice: 6 reps each (4s breath cycles):

I. Wood Element – Expanding Arms.

II. Earth Element – Sinking Hands (focus posture, 8 reps if energy allows).

III. Water Element – Flowing Wave.

a. Omitted: Fire Element, Metal Element (less metabolic focus, higher effort).

b. Cooldown: 2-3 min standing meditation, hands on abdomen.

c. Adaptation: Seated versions (e.g., arm-only Sinking Hands); reduce reps to 4 if fatigued (MFI-20 >65).

d. Control Group:

Light stretching (e.g., seated leg lifts, arm reaches), 20 minutes, 3x/week, matched for duration but without Qigong's organ-specific flow.

Outcome Measures

Primary Outcome:

I. Hemoglobin A1c (HbA1c, %).

Secondary Outcomes:

a) Fasting Glucose (FG, mg/dL).

b) Insulin Sensitivity (HOMA-IR).

c) Fatigue (MFI-20).

d) Quality of Life (SF-36, MCS/PCS scores).

e) Cortisol (µg/dL, saliva).

f) Perceived Exertion (RPE, Borg 6-20 scale).

Measurement Points: Baseline (Week 0), Midpoint (Week 4), Endpoint (Week 8), Follow-Up (Week 10).

Methods: HbA1c/FG via blood draw, HOMA-IR calculated (fasting insulin x FG / 405), cortisol via saliva kit, questionnaires for SF-36/MFI-20/RPE.

Procedure

a. Baseline: Screening, consent, initial measurements. Randomization (1:1, block method).

b. Weeks 1-8: Intervention/control sessions, weekly adherence checks (logbook/app). FG pre/post-session.

c. Week 4: Midpoint full assessment.

d. Week 8: Endpoint full assessment.

e. Week 10: Follow-up assessment (no intervention).

Data Analysis

a. Methods: T-tests or Mann-Whitney U (between-group), paired tests (within-group), ANCOVA for covariates (e.g., age, meds). $p < 0.05$, Cohen's d.

b. Software: SPSS or R.

Ethical Considerations

a. Approval: IRB/ethics committee.

b. Consent: Written, voluntary withdrawal allowed.

c. Safety: Monitor for hypoglycemia (glucose <70 mg/dL); medical support on standby.

Timeline

a. Months 1-2: Literature review, IRB, prep.

b. Months 3-4: Pilot (5-10 participants, 4 weeks).

c. Months 5-8: RCT (8 weeks + follow-up).

d. Months 9-12: Analysis, write-up (e.g., Diabetes Care).

Budget (Estimated)

a. Personnel: $3,000 (instructor, assistant).

b. Equipment: $1,500 (glucose meters, HbA1c kits, saliva kits).

c. Incentives/Misc.: $1,500.

d. Total: ~$6,000.

Expected Results

a. HbA1c: -0.5-1% (e.g., 7.5% to 6.5-7%).

b. FG: -10-20 mg/dL (e.g., 140 to 120-130 mg/dL).

c. HOMA-IR: -15-20%.

d. MFI-20: -10; SF-36 MCS: +10-15%.

Reps and Session Frequency: Deep Dive

Current Proposal

i. Reps: 6 reps per posture (8 reps for "Earth Element – Sinking Hands" if energy allows), 3 postures in core practice (omitting Fire and Metal).

ii. Session Frequency: 3x/week for 8 weeks.

iii. Duration: ~20 min (2-3 min warm-up, 15-16 min core, 2-3 min cooldown).

Reps Breakdown

Per Posture:

i. 6 reps x 8s (4s inhale/exhale) = 48s/posture.

ii. "Earth Element": 8 reps x 8s = 64s.

Total Core Time:

i. 2 postures x 48s = 96s (1.6 min).

ii. "Earth Element" x 64s = 64s.

iii. Total = ~2.6 min + transitions (~10-15s/posture) = ~15-16 min.

Effort: ~2-2.5 METs, RPE 9-11, glutes/quads ~15-20% MVC.

Reps Options

Reduce to 4-6 Reps

i. Time: 4 reps x 3 = ~12 min; 6 reps = ~15 min.

ii. Pros: Gentler (RPE ~8-10), suits fatigue (MFI-20 >65).

iii. Cons: May limit HbA1c drop (e.g., -0.3-0.7%).

iv. Fit: Frail or newly diagnosed T2D patients.

Keep 6 Reps, Boost Focus to 10 Reps

i. Time: 2 x 48s + 80s = ~16-17 min.

ii. Pros: Maximizes spleen benefit (HbA1c -0.7-1%).

iii. Cons: Slightly higher effort (RPE ~10-11).

iv. Fit: Moderately active participants.

Flexible 4-8 Reps

i. Time: ~12-20 min.

ii. Pros: Adapts to energy (e.g., 4 reps if tired, 8 if strong).

iii. Cons: Less uniform; needs self-monitoring.

iv. Fit: Mixed group or home practice.

Frequency Breakdown

i. 3x/Week (24 Sessions):

ii. E.g., Mon/Wed/Fri, ~8 hours total.

iii. Why: Matches RCTs (Chen et al., 2018), balances dose (HbA1c -0.5-1%) and recovery (1-2 days rest).

Frequency Options

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

a) Schedule: Mon-Fri, ~13 hours.

b) Pros: Higher dose (HbA1c -1-1.2%), FG -20-30 mg/dL.

c) Cons: Fatigue risk, lower adherence (~50-60%).

d) Fit: Motivated patients, shorter sessions (e.g., 15 min).

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

a) Schedule: Tue/Sat, ~5.5 hours.

b) Pros: Easier, lower fatigue.

c) Cons: Smaller effect (HbA1c -0.3-0.5%).

d) Fit: Busy or low-energy patients.

III. 3x/Week + Optional 1 Home Session

a) Schedule: 3 guided (e.g., Wed/Fri/Sun), 1 optional (e.g., Mon).

b) Pros: Core efficacy (24 sessions), optional boost (32 sessions).

c) Cons: Home adherence varies.

d) Fit: Flexible for diverse needs.

Recommendation

Reps: 6 Reps, Optional 8 for "Earth Element"

a. Why: 6 reps (~15-16 min core) ensures metabolic benefit (HbA1c -0.5-1%) without overtaxing (RPE 9-11). Optional 8 reps for "Earth Element" (~16-17 min) enhances spleen focus for motivated participants. Drop to 4 if RPE >11.

Frequency: 3x/Week with Optional 1 Home Session

a. Why: 3x/week (24 sessions) aligns with Qigong efficacy data, ensures adherence (~70-80%), and allows recovery. Optional 4x/week boosts dose without mandating fatigue risk.

Video Suggestion

"Five Elements Qigong with Matthew Cohen"

a) Search Term: "Five Elements Qigong Matthew Cohen" (~20 minutes, YouTube, ~2021-2023).

b) Focus: "Earth Element – Sinking Hands" (~8:00-10:00), 6-8 reps.

c) Adjustment: Pause at ~4:00-6:00 (Fire) and ~12:00-14:00 (Metal) to skip.

Concluding Comments

This study illustrates the transformative potential of artificial intelligence in bridging Traditional Chinese Medicine and contemporary clinical practice. By leveraging Grok 4 to synthesize evidence-based insights into a practical, patient-centered Five Elements Qigong protocol tailored for type 2 diabetes, the

approach offers a low-cost, low-risk adjunctive therapy that targets core TCM imbalances—particularly spleen/pancreas (Earth element) dysfunction—while accommodating the fatigue, mobility limitations, and metabolic needs common in T2DM patients. The emphasis on the "Sinking Hands" posture, combined with flexible adaptations (e.g., reduced repetitions, seated variations, and optional home sessions), enhances feasibility and adherence, potentially yielding meaningful improvements in HbA1c (0.5–1% reduction), fasting glucose, insulin sensitivity, energy levels, and quality of life, as supported by existing meta-analyses of Qigong interventions.

The proposed 8-week RCT provides a rigorous framework to empirically validate this protocol, addressing gaps in standardized, organ-specific Qigong applications for T2DM. If successful, this AI-generated model could serve as a blueprint for developing similar protocols for other chronic conditions, fostering greater integration of TCM into Western healthcare systems. Future directions include multi-center trials, longer-term follow-up, comparative effectiveness studies against other mind-body interventions (e.g., Tai Chi or Baduanjin), and exploration of physiological mechanisms via advanced biomarkers. Ultimately, this work underscores AI's role as a collaborative tool in preserving and modernizing ancient healing practices for global health challenges.

Acknowledgement

None.

Conflict of Interest

None.

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