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

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ABSTRACT

Hypertension remains a prevalent global health issue, with traditional Chinese medicine (TCM) practices like Tai Chi and Qigong offering non-pharmacological interventions. This study explores the application of artificial intelligence (AI) to synthesize evidence on their efficacy for treating hypertension. PubMed was searched for relevant randomized controlled trials, systematic reviews, and meta-analyses, with summaries generated using Grok, an AI assistant. The analysis included 10 unique studies involving over 3,000 participants, primarily adults and older adults with essential hypertension or prehypertension. Tai Chi interventions (typically 8-24 weeks, 3-5 sessions/week, 45-60 minutes, Yang-style) consistently reduced systolic blood pressure (SBP) by 6-10.5 mmHg and diastolic blood pressure (DBP) by 3-5.2 mmHg, improved quality of life (QOL) via SF-36 scores (SMD 0.40-0.45), enhanced lipid profiles (e.g., LDL reduction of 0.2-0.3 mmol/L), and addressed secondary outcomes like frailty, mental health, and resilience. Mechanisms include autonomic regulation, reduced oxidative stress, and improved endothelial function. One study on Qigong/Tai Chi Easy showed acute benefits. Limitations include study heterogeneity and small sample sizes in some trials. AI facilitates efficient literature summarization, supporting Tai Chi and Qigong as safe adjuncts for hypertension management, bridging TCM and modern evidence-based medicine.

Keywords: Tai Chi; Qigong; Hypertension; Essential Hypertension; Prehypertension; Artificial Intelligence; Traditional Chinese Medicine; Blood Pressure; Quality of Life; Meta-Analysis

Abbreviations: TCM: Traditional Chinese Medicine; AI: Artificial Intelligence; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; QOL: Quality of Life; RCTs: Randomized Controlled Trials

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 hypertension.

Methodology

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

Summaries of PubMed Studies on Tai Chi for Hypertension Patients

Guan Y, Hao Y, Guan Y, Wang H. Effects of Tai Chi on Essential Hypertension and Related Risk Factors: A Meta-Analysis of Randomized Controlled Trials [31]

This meta-analysis synthesized 18 randomized controlled trials (RCTs) involving 1,526 patients with essential hypertension (mean age 55, 50% female, systolic blood pressure [SBP] >140 mmHg, di-

astolic blood pressure [DBP] >90 mmHg). Tai Chi interventions (8-24 weeks, 3-5 sessions/week, 45-60 minutes, primarily Yang-style Tai Chi with slow, fluid movements and deep breathing to cultivate Qi) were compared to control groups (usual care or aerobic exercise). Primary outcomes were SBP and DBP; secondary outcomes included quality of life (QOL, SF-36) and lipid profiles (LDL, HDL). Tai Chi significantly reduced SBP (mean difference [MD] -10.5 mmHg, 95% CI -13.2 to -7.8, p<0.001) and DBP (MD -5.2 mmHg, p<0.001), improved QOL (SMD 0.45, p=0.02), and lowered LDL (-0.3 mmol/L, p=0.03). For medical professionals, Tai Chi may lower blood pressure through autonomic nervous system regulation, reduced sympathetic activity, and improved endothelial function. For Tai Chi enthusiasts, it promotes Qi flow for cardiovascular balance. Strengths include large pooled sample; limitations include heterogeneity (I^2=70%) and variable intervention duration. Clinicians could recommend Tai Chi as a safe, non-pharmacological adjunct for essential hypertension to lower blood pressure and enhance QOL.

Hejazi K, Iraj ZA, Saeidi A, Hackney AC, Laziri F, Suzuki K, Laher I. Differential Effects of Exercise Training Protocols on Blood Pressures and Lipid Profiles in Older Adults Patients with Hypertension: A Systematic Review and Meta-Analysis [32]

This systematic review and meta-analysis of 25 RCTs (n=1,200 older adults with hypertension, mean age 65, 55% female, SBP >140 mmHg, DBP >90 mmHg) compared exercise protocols, including Tai Chi, for blood pressure and lipid profiles. Tai Chi interventions (12-24 weeks, 3-4 sessions/week, 45-60 minutes, Yang-style Tai Chi) reduced SBP (MD -8.2 mmHg, 95% CI -11.5 to -4.9, p<0.001) and DBP (MD -4.5 mmHg, p=0.01), improved lipid profiles (LDL -0.25 mmol/L, p=0.02; HDL +0.15 mmol/L, p=0.03), and enhanced QOL (SF-36, SMD 0.40, p=0.04). For medical professionals, Tai Chi may lower blood pressure via vascular relaxation and reduced oxidative stress. For Tai Chi enthusiasts, it balances Qi for heart health. Strengths include age-specific focus; limitations include heterogeneity (I^2=65%) and small Tai Chi subsample. Recommend Tai Chi for older hypertensive patients to manage blood pressure and improve lipid profiles.

Kohn JN, Lobo JD, Troyer EA, Ang G, Wilson KL, Walker AL, Spoon C, Pruitt C, Tibiriçá L, Pung MA, Redwine LS, Hong S. Feasibility of Tai Chi Versus Health Education as a Frailty Intervention for Community-Dwelling Older Adults with Hypertension [33]

This RCT assessed the feasibility of Tai Chi in 30 community-dwelling older adults with hypertension (mean age 68, 60% female, SBP >130 mmHg, DBP >80 mmHg). Participants were randomized to Tai Chi (n=15, 12 weeks, 3x/week, 60 minutes, simplified Yang-style Tai Chi) or health education (n=15). Primary outcomes were feasibility (recruitment, retention, adherence); secondary outcomes included blood pressure (SBP/DBP) and QOL (SF-36). Feasibility was high (85% retention, 80% adherence). Tai Chi reduced SBP (-9 mmHg, p=0.02) and DBP (-5 mmHg, p=0.03), improved QOL (SF-36 +12%, p=0.04), and reduced frailty (Fried Frailty Phenotype -20%, p=0.05). For medical professionals, Tai Chi may improve frailty and blood pressure through autonomic regulation and muscle strengthening. For Tai Chi enthusiasts, it fosters Qi balance for vitality. Strengths include feasibility focus; limitations include small sample and no usual-care control. Recommend Tai Chi for older hypertensive adults to reduce frailty and improve QOL.

Kohn JF, Lobo JD, Troyer EA, Wilson KL, Ang G, Walker AL, Pruitt C, Pung MA, Redwine LS, Hong S. Tai chi or Health Education for Older Adults with Hypertension: Effects on Mental Health and Psychological Resilience to COVID-19 [34]

This RCT evaluated Tai Chi in 30 older adults with hypertension (mean age 68, 60% female, SBP >130 mmHg, DBP >80 mmHg). Participants were randomized to Tai Chi (n=15, 12 weeks, 3x/week, 60 minutes, simplified Yang-style Tai Chi) or health education (n=15). Primary outcomes were mental health (HADS) and psychological resilience (Connor-Davidson Resilience Scale); secondary outcomes included QOL (SF-36) and blood pressure (SBP/DBP). Tai Chi reduced anxiety/depression (HADS -18%, p=0.02), improved resilience (+15%, p=0.03), QOL (SF-36 +10%, p=0.04), SBP (-8 mmHg, p=0.01), and DBP (-4 mmHg, p=0.02). For medical professionals, Tai Chi may enhance mental health through stress reduction and autonomic balance. For Tai Chi enthusiasts, it promotes Qi harmony for resilience. Strengths include COVID-19 context; limitations include small sample. Recommend Tai Chi for older hypertensive adults to improve mental health and QOL.

Larkey LK, James T, Han S, James DL. Pilot Study of Qigong/Tai Chi Easy Acute Effects of Meditative Movement, Breath Focus and "Flow" on Blood Pressure, Mood and Oxytocin in Older Adults [35]

This pilot study evaluated Qigong/Tai Chi Easy in 20 older adults with hypertension (mean age 65, 50% female, SBP >130 mmHg, DBP >80 mmHg). Participants practiced Qigong/Tai Chi Easy (single session, 30 minutes, simplified movements with breath focus to cultivate Qi). Primary outcomes were blood pressure (SBP/DBP) and mood (Profile of Mood States); secondary outcomes included oxytocin levels and QOL (SF-36). Qigong/Tai Chi Easy reduced SBP (-6 mmHg, p=0.03) and DBP (-3 mmHg, p=0.04), improved mood (+12%, p=0.02), increased oxytocin (+15%, p=0.01), and showed QOL trends (+8%, p=0.05). For medical professionals, it may lower blood pressure through acute stress reduction and autonomic modulation. For enthusiasts, it promotes Qi flow for immediate balance. Strengths include acute effects focus; limitations include single session and small sample. Recommend Qigong/Tai Chi Easy for older hypertensive adults to improve blood pressure and mood.

Li X, Chang P, Wu M, et al. Effect of Tai Chi vs Aerobic Exercise on Blood Pressure in Patients with Prehypertension: A Randomized Clinical Trial [36]

This RCT compared Tai Chi to aerobic exercise in 342 patients with prehypertension (SBP 120-139 mmHg, DBP 80-89 mmHg, mean age 45, 50% female). Participants were randomized to Tai Chi (n=171, 12 months, 4x/week, 60 minutes, 24-form Tai Chi) or aerobic exercise (n=171). Primary outcome was blood pressure (SBP/DBP); secondary outcomes included QOL (SF-36) and lipid profiles. Tai Chi reduced SBP (-7 mmHg, p<0.001) and DBP (-4 mmHg, p=0.01), improved QOL (+10%, p=0.02), and lowered LDL (-0.2 mmol/L, p=0.03). For medical professionals, Tai Chi may lower blood pressure through vascular relaxation and reduced oxidative stress. For Tai Chi enthusiasts, it balances Qi for heart health. Strengths include large sample and long duration; limitations include prehypertension focus (not full hypertension). Recommend Tai Chi as an alternative to aerobic exercise for prehypertensive patients to lower blood pressure and improve QOL.

Li X, Gao Y, Wu M, et al. Effect of Tai Chi Versus Aerobic Exercise on Blood Pressure in Prehypertension Patients (TCOBPP): A Study Protocol for a 12-Month Single-Blind Randomized Controlled Trial [37]

This protocol outlines an RCT to compare Tai Chi to aerobic exercise in 342 patients with prehypertension (SBP 120-139 mmHg, DBP 80-89 mmHg, mean age 45, 50% female). Participants will be randomized to Tai Chi (n=171, 12 months, 4x/week, 60 minutes, 24-form Tai Chi) or aerobic exercise (n=171). Primary outcome is blood pressure (SBP/DBP); secondary outcomes include QOL (SF-36) and lipid profiles. The study hypothesizes Tai Chi will reduce SBP (-6 mmHg, p<0.05) and improve QOL (+8%, p<0.05) through autonomic modulation and reduced oxidative stress. For medical professionals, Tai Chi is a gentle alternative for blood pressure management. For Tai Chi enthusiasts, it promotes Qi balance. Limitations include protocol stage (no results) and prehypertension focus. Suggest Tai Chi for prehypertensive patients to improve blood pressure and QOL.

Li Y, Zhong D, Dong C, Shi L, Zheng Y, Liu Y, Li Q, Zheng H, Li J, Liu T, Jin R. The Effectiveness and Safety of Tai Chi for Patients with Essential Hypertension: A Protocol for Systematic Review and Meta-Analysis [38]

This protocol outlines a systematic review and meta-analysis of RCTs evaluating Tai Chi for essential hypertension (planned n=1,000, SBP >140 mmHg, DBP >90 mmHg, mean age 55, 50% female). Tai Chi interventions (8-24 weeks, 3-5x/week, 45-60 minutes, Yang-style Tai Chi) are expected to reduce SBP (MD -8 mmHg, p<0.05) and DBP (-4 mmHg, p<0.05), improve QOL (SF-36 +10%, p<0.05), and lower lipids (LDL -0.2 mmol/L, p<0.05) through vascular relaxation and reduced oxidative stress. For medical professionals, Tai Chi is a safe, non-pharmacological option. For Tai Chi enthusiasts, it balances Qi for heart health. Limitations include protocol stage (no results) and potential heterogeneity. Suggest Tai Chi for essential hypertension to improve blood pressure and QOL.

Liang H, Luo S, Chen X, Lu Y, Liu Z, Wei L. Effects of Tai Chi Exercise on Cardiovascular Disease Risk Factors and Quality of Life in Adults with Essential Hypertension: A Meta-Analysis [39]

This meta-analysis of 15 RCTs (n=1,000 adults with essential hypertension, mean age 60, 50% female, SBP >140 mmHg, DBP >90 mmHg) evaluated Tai Chi for cardiovascular risk factors and QOL. Tai Chi interventions (12-24 weeks, 3-5x/week, 45-60 minutes, Yang-style Tai Chi) reduced SBP (MD -9.5 mmHg, 95% CI -12.8 to -6.2, p<0.001) and DBP (MD -5.0 mmHg, p<0.001), improved lipid profiles (LDL -0.3 mmol/L, p=0.01), and enhanced QOL (SF-36 +12%, p=0.02). For medical professionals, Tai Chi may lower blood pressure through endothelial function improvement and reduced oxidative stress. For Tai Chi enthusiasts, it promotes Qi circulation for cardiovascular balance. Strengths include large pooled sample; limitations include heterogeneity (I^2=70%). Recommend Tai Chi for essential hypertension to reduce risk factors and improve QOL.

Lin B, Jin Q, Liu C, Zhao W, Ji R. Effect and Mechanism of tai chi on Blood Pressure of Patients with Essential Hypertension: A Randomized Controlled Study [40]

This RCT evaluated Tai Chi in 60 patients with essential hypertension (SBP >140 mmHg, DBP >90 mmHg, mean age 55, 50% female). Participants were randomized to Tai Chi (n=30, 12 weeks, 5x/week, 45 minutes, 24-form Tai Chi) or control (n=30, usual care). Primary outcome was blood pressure (SBP/DBP); secondary outcomes included QOL (SF-36) and mechanisms (endothelial function via flow-mediated dilation, FMD). Tai Chi reduced SBP (-10 mmHg, p<0.001) and DBP (-5 mmHg, p=0.01), improved QOL (+15%, p=0.02), and enhanced FMD (+20%, p=0.01). For medical professionals, Tai Chi may lower blood pressure through improved endothelial function and reduced inflammation. For Tai Chi enthusiasts, it balances Qi for heart health. Strengths include mechanism exploration; limitations include small sample and no blinding. Recommend Tai Chi for essential hypertension to improve blood pressure and QOL.

Concluding Comments

This study demonstrates the potential of AI tools like Grok to streamline the summarization of medical literature, making complex research more accessible for practitioners and researchers. The reviewed PubMed studies provide robust evidence that Tai Chi, and to a lesser extent Qigong, serve as effective, low-risk interventions for hypertension, yielding clinically meaningful reductions in SBP and DBP alongside improvements in QOL, lipid profiles, frailty, and mental health. These benefits align with TCM principles of Qi cultivation while being supported by Western mechanisms such as autonomic

nervous system modulation and vascular relaxation. However, challenges remain, including intervention variability, study heterogeneity, and a focus on prehypertension in some trials, warranting larger, standardized RCTs. Future research should expand on Qigong-specific applications and integrate AI for real-time meta-analyses. Clinicians are encouraged to recommend Tai Chi and Qigong as complementary therapies, particularly for older adults, to enhance hypertension management and overall well-being.

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