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Effectiveness of Tai Chi exercise on balance, falls, and motor function in older adults: a meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 August 2024 and was last updated on 17 August 2024.

INTRODUCTION

Review question / Objective population:older; intervention:tai chi exercise; comparison:The control group was offered regular exercises (RE) or physical treatments (PT), which included resistance training, balance training, strength training, and walking training. These types of outcome measures were designed to assess the effectiveness of the interventions; outcomes: berg Balance Scale, tinetti Balance Scale, standing with eyes closed on one leg, Standing up and walking, Fall Effectiveness Scale, Fear of falling, etc.

Condition being studied Falls among older adults present a significant public health challenge, leading to increased morbidity, loss of independence, and mortality. As the global population ages, the prevalence of falls is expected to rise, making effective interventions essential. Falls in the elderly are linked to fractures, traumatic brain injuries, and declines in physical and cognitive function, often resulting in greater dependency and institutionalization. In response, preventative strategies, especially those involving exercise focusing on balance and strength, have gained attention. Among these, Tai Chi, a traditional Chinese martial art with slow, controlled movements, has emerged as a promising, low-impact exercise for improving balance, proprioception, and motor function in older adults.Systematic reviews and meta-analyses have examined Tai Chi's role in fall prevention, yielding mixed results. Some studies suggest Tai Chi significantly reduces fall risk and enhances balance, while others find minimal benefits, sparking debate over its efficacy. These mixed outcomes may result from variations in study methodologies, differences in Tai Chi styles, the intensity and frequency of practice, participant health status, and other influencing factors. For example, specific styles like Yang or Sun Tai Chi may be more effective due to their focus on balance and stability, and the frequency and duration of practice might also be critical in determining effectiveness.This meta-analysis seeks to address these inconsistencies by offering

a comprehensive synthesis of the latest evidence on Tai Chi's effectiveness in improving balance, reducing falls, and enhancing motor function in older adults. By including the most recent randomized controlled trials (RCTs) and employing rigorous methodologies, this study aims to clarify Tai Chi's true impact. Additionally, the analysis will explore the moderating effects of different Tai Chi styles, the dose-response relationship of exercise frequency and duration, and the influence of baseline characteristics such as age, gender, and fall risk. Understanding these factors is crucial for developing targeted, evidence-based recommendations for Tai Chi as a fall prevention strategy in the aging population. providing valuable insights for clinicians, caregivers, and policymakers.

METHODS

Participant or population According to the World Health Organization's definition of the elderly, our study included individuals aged 60 and above who live in nursing institutions or local communities and had not practiced Tai Chi in the previous 12 months. Participants were excluded if they had a degenerative neurological condition, such as Parkinson's disease, dementia, or a severely debilitating stroke; if they had severe arthritis; marked vision impairments; or if they were unable to walk across a room independently.

Intervention Implementing Tai Chi practice as a strategic intervention, this process must last for no less than three months under the strict supervision of senior Tai Chi instructors. No specific guidance was given to the participants for additional training in Tai Chi practice independently.

Comparator The comparison group implemented conventional exercise intervention (RE), covering resistance, balance, muscle strength improvement and gait improvement training modules to evaluate the effect indicators of various therapies.

Study designs to be included Randomized controlled trial.

Eligibility criteria The studies included in this meta-analysis should meet the following criteria: 1) Randomized controlled trials should be used; 2) Participants should be elderly (≥60 years old); 3) The intervention measure of the experimental group was Tai Chi; 4) Participants in the control group were treated with routine treatment or routine exercise; 5) Study results for balance, falls, and physical functioning in older adults. We excluded studies based on the following criteria: 1) The study language was not English; 2) The research is not the original research, but a review, letter or review.

Information sources PubMed, web of science, EMbase, Cochrance Library, etc.

Main outcome(s) berg Balance Scale, tinetti Balance Scale, standing with eyes closed on one leg, Standing up and walking, Fall Effectiveness Scale, Fear of falling, etc.

Quality assessment / Risk of bias analysis Cochrane.

Strategy of data synthesis Statistical analysis was performed using RevMan 5.1 software, and measurement data were measured using mean difference (MD) or standardized mean Difference (SMD).If I^2 0.1, there is no heterogeneity, choose the fixed effects model, if $I^2 > 50\%$orP < 0.1,There is heterogeneity, choose the random effects model.

Subgroup analysis If there was statistical heterogeneity, the analyses were different. The cause of qualitative development, if there is clinical heterogeneity, can be determined according to its source. Subgroup analysis or row sensitivity analysis; In the absence of significant clinical heterogeneity. The random effects model was used for meta-analysis. If heterogeneity is too high. If large, descriptive analysis is performed. If indicators cannot be merged, describe them analyze.

Sensitivity analysis We plan to conduct a sensitivity analysis using REV5.1 to explore the effects, reflecting the sensitivity of the article by the change in the effect size after deleting one of the articles.

Country(ies) involved China.

Keywords Tai Chi exercise; Balance; Falling; motor function; meta-analysis.

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