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Effects of different exercise types on balance function in healthy older adults and Parkinson's patients：A systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - This study received funding from Lu Tang and the Central University Fundamental Fund Project (PHD2023-02). It was also supported by the CAFUC Institute of Aeronautical Sports (JG2022-34-02) and the Sichuan Philosophy and Social Science Planning Project 2022 (SC22B001).

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202470042

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 July 2024 and was last updated on 11 July 2024.

INTRODUCTION

Review question / Objective The aim of this study is to compare the effects of Tai Chi, yoga, and resistance training on balance function in healthy elderly individuals and patients with Parkinson's disease. Given the well-documented benefits of these three exercise types in enhancing balance and motor function, it is crucial to assess their differential impacts.

Condition being studied Currently, with the intensification of population aging, it is estimated that by 2030, the prevalence of Parkinson's disease (PD) will exceed one million cases. This trend highlights the importance of optimizing the care and management of PD patients. At present, the treatment of Parkinson's disease is mainly divided into conventional and permanent treatments. Conventional treatments include dopamine replacement therapy or dopamine receptor agonists, as well as surgical treatments. Although these therapies can alleviate the motor symptoms of Parkinson's disease (such as tremors, bradykinesia, and muscle stiffness) to some extent, long-term use may lead to side effects.

In recent years, there has been a growing body of research on the effects of exercise on the balance function of the elderly and Parkinson's disease patients. Current studies show that exercises such as Tai Chi, yoga, and resistance training can effectively improve the balance ability of the elderly. These research findings provide strong support for enhancing motor function and balance ability through various forms of exercise.

However, most current research focuses on the impact of a single type of exercise on balance function, lacking comparisons between different types of exercise. Some reviews only focus on the effects of specific exercises like wobble board training, dance, or Tai Chi on balance function,

without comparing the differences between various types of exercise.

METHODS

Search strategy (TITLE-ABS-KEY ("parkinson disease") OR TITLE-ABS-KEY ("parkinsonism") OR TITLE-ABS-KEY ("idiopathic parkinsonism") OR TITLE-ABS-KEY ("primary parkinsonism"))
(TITLE-ABS-KEY ("tai ji") OR TITLE-ABS-KEY (" tai chi") OR TITLE-ABS-KEY ("tai chi") OR TITLE-ABS-KEY ("chi, tai") OR TITLE-ABS-KEY ("tai ji quan") OR TITLE-ABS-KEY ("tai chi chuan") OR TITLE-ABS-KEY ("t'ai chi") OR TITLE-ABS-KEY ("taijiquan"))
(TITLE-ABS-KEY("resistance training ") OR TITLE-ABS-KEY(" strength training") OR TITLE-ABS-KEY("weight training") OR TITLE-ABS-KEY("resistance exercise"))
(TITLE-ABS-KEY (" Older adult") OR TITLE-ABS-KEY (" older elderly") OR TITLE-ABS-KEY ("older"))
(TITLE-ABS-KEY (" Balance") OR TITLE-ABS-KEY (" balance function") OR TITLE-ABS-KEY ("balance ability") OR TITLE-ABS-KEY ("balance"))
PubMed, Web of Science, Scopus, and the Cochrane Library databases.

Participant or population The study population comprised healthy older adults aged 50 years and older, as well as patients with mild to moderate Parkinson's disease.

Intervention In the experimental group, the intervention consisted of various types of exercise.

Comparator The study incorporated at least one or more of the following assessments: the Berg Balance Scale, Timed up-and-go test, UPDRS-III.

Study designs to be included The aim was to investigate the effects of different exercise types (Tai Chi, yoga, resistance training) on balance function in both healthy older adults and Parkinson's patients. The outcome indicators were complete and available in full text, and only randomized controlled trials (RCTs) were included.

Eligibility criteria The study population comprised healthy older adults aged 50 years and older, as well as patients with mild to moderate Parkinson's disease.
In the experimental group, the intervention consisted of various types of exercise interventions or a single type of Tai Chi, resistance training, or yoga. The control group received no exercise intervention, or alternative forms of movement and exercise were utilized.
The study incorporated at least one or more of the following assessments: the Berg Balance Scale, Timed up-and-go test, UPDRS-III.
The aim was to investigate the effects of different exercise types (Tai Chi, yoga, resistance training) on balance function in both healthy older adults and Parkinson's patients.
The outcome indicators were complete and available in full text, and only randomized controlled trials (RCTs) were included.

Information sources PubMed, Web of Science, Scopus, and the Cochrane Library databases.

Main outcome(s) The primary outcome measures were the Berg Balance Scale (BBS) and the Timed Up and Go test (TUG), while the secondary measure was the Unified Parkinson's Disease Rating Scale (UPDRS) III.

Quality assessment / Risk of bias analysis The risk of bias was assessed using the Cochrane risk of bias tool.

Strategy of data synthesis Extracted and synthesized information from articles and data, creating a data extraction table that followed systematic review characteristics of similar research topics. The extracted information encompassed the first author's name, average age, year of publication, intervention program details (method, duration, frequency), testing method, and main conclusions. The synthesized information is presented in Table 2.A random effects model was employed, and heterogeneity was measured using the I^2statistic.

Subgroup analysis The balance function (BBS) was the primary outcome, while motor functions (TUG, UPDRS-III) were secondary outcomes. Given the high variability of UPDRS-III scores between studies, we used the standardized mean difference (SMD) for the combined analysis. For the analysis of TUG and BBS results, the mean difference (MD) was used, and statistical analyses were conducted using weighted average differences within a 95% confidence interval.

Sensitivity analysis In cases of significant heterogeneity among the studies (p 50%), sensitivity analyses and subgroup analyses were conducted to ensure the robustness of the results and identify the sourcesof.

Country(ies) involved China.

Keywords Parkinson's disease, healthy older adults, Tai Chi, yoga, resistance exercise, balance function, exercise intervention.

Contributions of each author

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