Tai Chi’s impact on motor and non-motor outcomes in Parkinson’s disease: A systematic review and meta-analysis

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Background

- Parkinson’s disease (PD) is one of the most common progressive neurodegenerative disorders leading to loss of motor function and reduced quality of life. A growing body of evidence supports the role of exercise in improving both motor and non-motor outcomes, and exercise is now considered an integral part of the management of PD.

- Tai Chi and Qigong are multi-component mind-body exercises that are growing in popularity due to their demonstrated effects as interventions for treating PD symptoms and possibly delaying progression. Both integrate training in balance, flexibility, neuromuscular coordination, and multiple aspects of cognition, which together may result in benefits to the management of PD.

Study Aims

- Using a meta-analytic approach, this study aimed to systematically evaluate and quantify the effects of Tai Chi and Qigong on multiple measures of motor and non-motor outcomes in patients with PD.

Methods

PRISMA guideline:

- Methods in this study follow those recommended by the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA).

Literature search:

- Electronic literature searches were performed using Pubmed, Web of Science, Science Direct, Scopus, and Cochrane Library for English language articles published until August 30, 2016.

- Search terms were tai chi, tai chi chuan, taiji, qigong, and Parkinson’s disease. Additional manual searches were performed using Google Scholar and reference lists of the retrieved articles.

Eligibility Criteria:

- Randomized controlled trials (RCTs) published in English, in which Parkinson’s disease was the primary disease and Tai Chi and/or Qigong were the primary intervention were included in quantitative synthesis.

Results

- 15 RCTs with 753 patients with PD were included in meta-analyses.
- Comparison groups included no treatment or usual care group (n=7, 47%) and exercise control group (n=8, 53%).
- Duration of Tai Chi training was ranged from 2 to 6 months.

Risk of Bias Assessment

- Risk of Bias assessed by the 10 item Cochrane Collaboration Tool. A score of ≤ 5 points (10 being greatest bias) was considered as acceptable quality.

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*NS: NR (no report about specific method); AR (report about specific method)

Statistical Analysis

- Comprehensive Meta Analysis V. 3 was used for data synthesis. For continuous data, Hedge’s g for effect size (ES) and 95% confidence intervals (CI) of fixed effect model were calculated for all eligible trials.
- The I² statistics and Q value was employed in assessing heterogeneity with the criteria of 75% or greater to confirm heterogeneity.
- Publication bias was evaluated using funnel plot and classic fail-safe N.

Effects on Motor Function

- 11 studies assessed UPDRS III.
- Combined ES= 0.444, 95% CI 0.282 to 0.606, p< .001.
- Subgroup analysis with active control group (ES= 0.368, p=.001) and no treatment control group (ES= 0.555, p< .001).
- I² shows no heterogeneity.

United Parkinson’s Disease Rating Scale (UPDRS) III

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- Combined ES= 0.444, 95% CI 0.282 to 0.606, p< .001.
- Subgroup analysis with active control group (ES= 0.368, p=.001) and no treatment control group (ES= 0.555, p< .001).
- I² shows no heterogeneity.

6 minute walking (6MW)

- 4 studies assessed 6MW.
- Combined ES= -0.298, 95% CI -0.603 to 0.017, p=.064.
- I² shows no heterogeneity.

Effects on Non-Motor Function

Quality of Life (QOL)

- 6 studies assessed QOL with combined ES= -0.393, 95% CI 0.174 to 0.612, p< .001.
- Subgroup analysis with active control group (ES= -0.502, p< .001) and no treatment control group (ES= -0.226, p= .204).
- I² shows no heterogeneity.

Depression

- 4 studies assessed depression with combined ES= -0.457, 95% CI -0.795 to -0.118, p=.008.
- I² shows no heterogeneity.

Cognition

- 2 studies assessed cognition with combined ES= -0.225, 95% CI -0.845 to -0.711, p=.008.
- I² shows no heterogeneity.

Conclusions

- Evidence supports a potential benefit of Tai Chi for improving motor and non-motor outcomes for individuals with PD, but results must be interpreted cautiously due to methodological bias in many studies.
- Additional large-scale and methodologically rigorous trials are warranted to better characterize the effects of Tai Chi in PD and to guide selection of optimal doses and specific protocols for individuals with different constellations of symptoms.

Acknowledgments

- This study was supported by the grants from the Davis Phinney Foundation for Parkinson’s and Chugunam National University, Korea.

Figure 1: Summary of the flow of literature search according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.