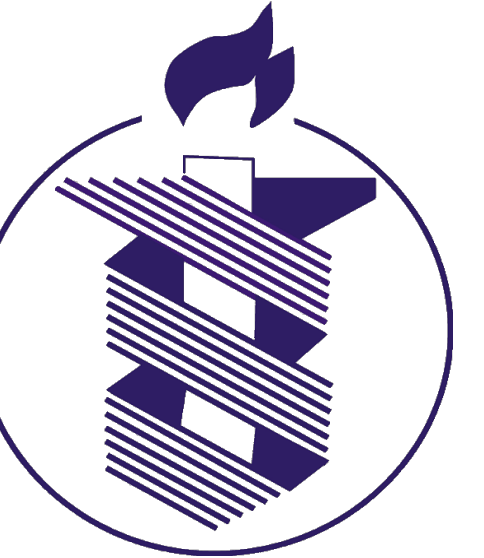


Tai Chi's impact on motor and non-motor outcomes in Parkinson's disease: A systematic review and meta-analysis



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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.

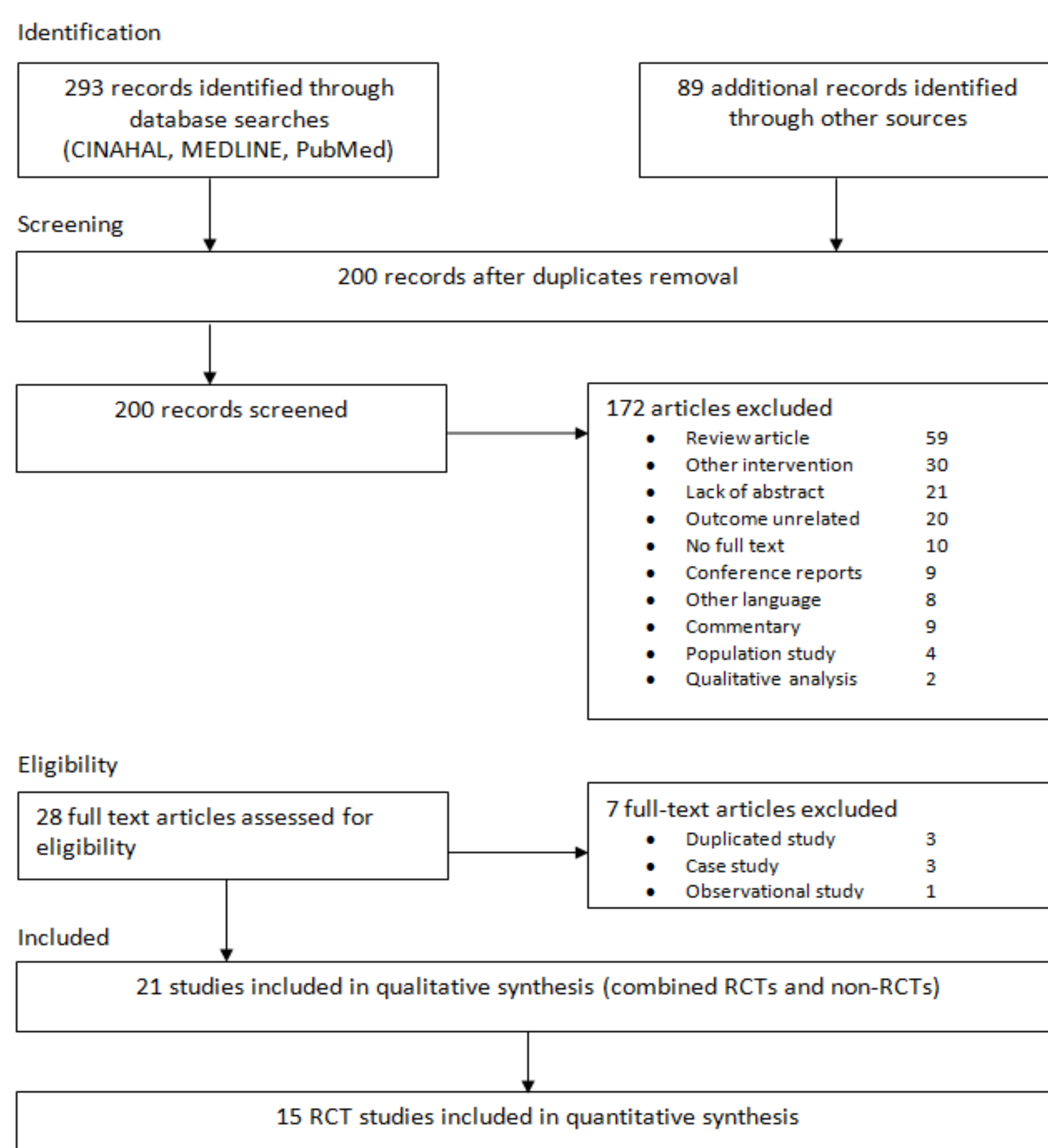


Figure 1. Summary of the flow of our literature search according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines

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.

Study	Selection Bias		Performance bias			Attrition bias	Reporting bias	Eligibility criteria	Difference at baseline	Rational for sample size	Other bias	Total
	Random sequence	Allocation concealment	Blinding of participants	Blinding of outcome assessment	Incomplete outcome data (ITT)							
Burini 2006	0	0	0	0	1	0	0	0	0	1	0	2
Amano 2014	NS	NR	NR	0	0	1	0	0	0	0	0	1
Choi 2013	NS	NR	NR	0	1	0	0	0	0	1	0	2
Kurlan 2015	NS	NR	NR	0	1	0	0	0	0	1	UGS	2
Li 2014	0	NR	NR	0	0	1	0	0	0	1	0	2
Li 2015	0	NR	NR	0	0	1	0	0	0	0	0	1
Li 2012	0	NR	NR	0	0	1	0	0	0	0	0	1
Schmitz-Hubsch 2006	NS	NR	NR	0	0	0	0	0	0	1	0	1
Xiao 2015	NS	NR	NR	0	1	0	0	0	0	1	0	2
Zhang 2015	0	0	NR	0	0	0	0	0	0	0	0	0
Gao 2014	0	NR	NR	0	1	0	0	0	0	1	0	2
Hackney 2008	1	NR	NR	0	0	0	0	0	0	1	0	2
Gladfelter 2011	1	NR	0	0	1	0	0	0	0	1	0	3
Hackey 2009	1	NR	0	NR	1	0	0	1	1	1	0	4
Nocera 2014	NS	NR	NR	0	1	1	0	0	0	0	0	2

*Note. NS (no report about specific methods); NR (not reported); UGS (unequal group size).

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 I^2 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.

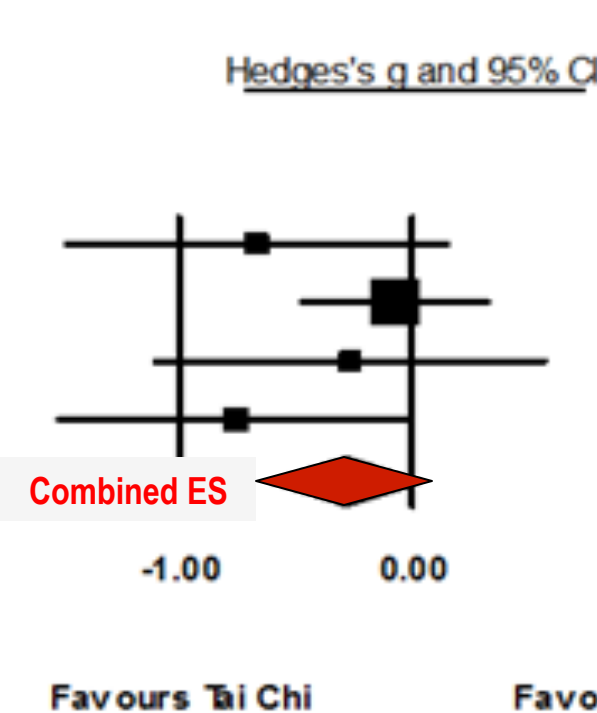
Results

- 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.

Effects on Motor Function

United Parkinson's Disease Rating Scale (UPDRS) III

- 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, $p < .001$).
- I^2 shows no heterogeneity.

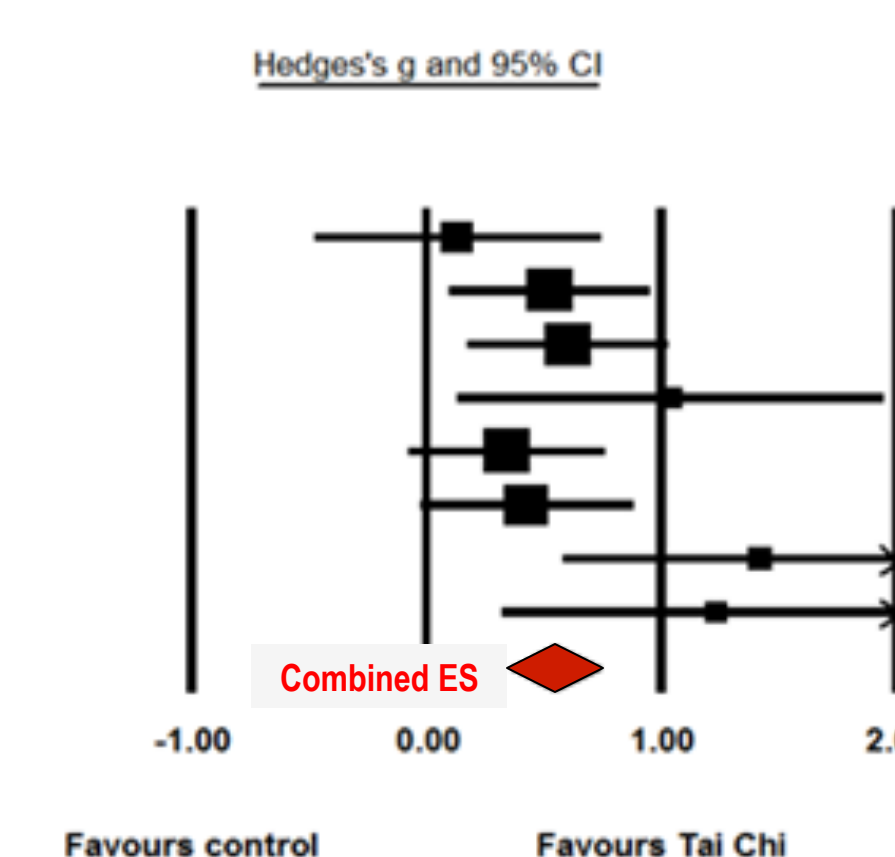
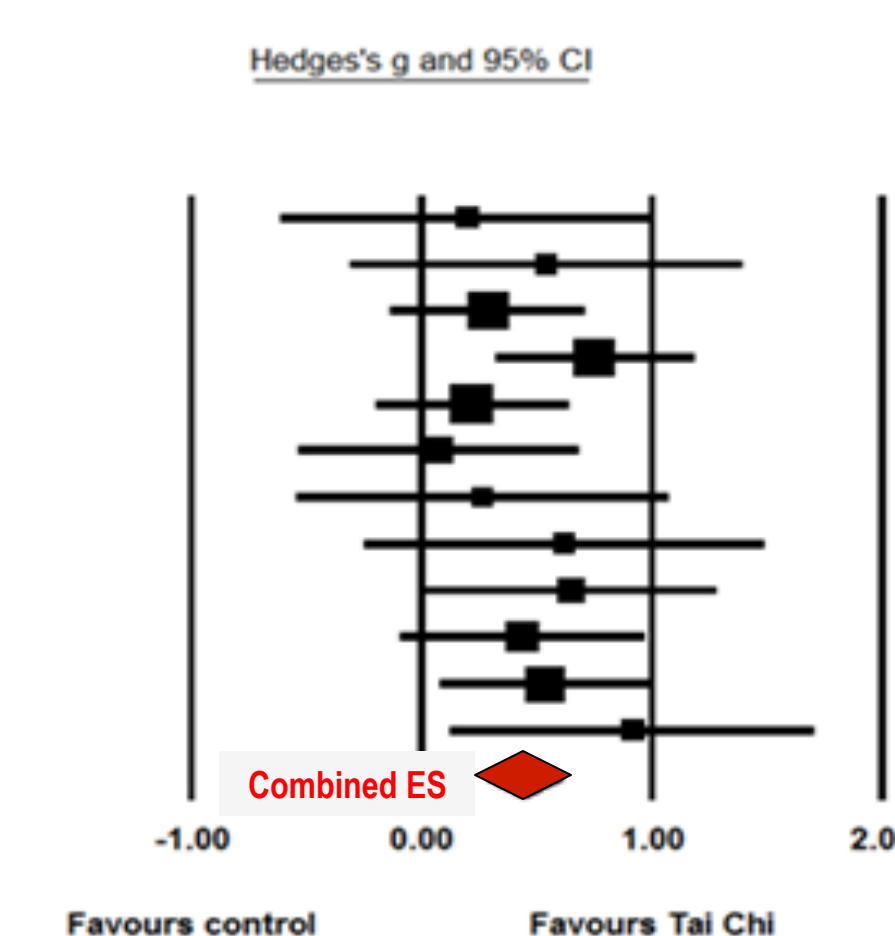


6 minute walking (6MW)

- 4 studies assessed 6MW
- Combined ES= -0.293, 95% CI -0.603 to 0.017, $p = .064$.
- I^2 shows no heterogeneity.

Balance

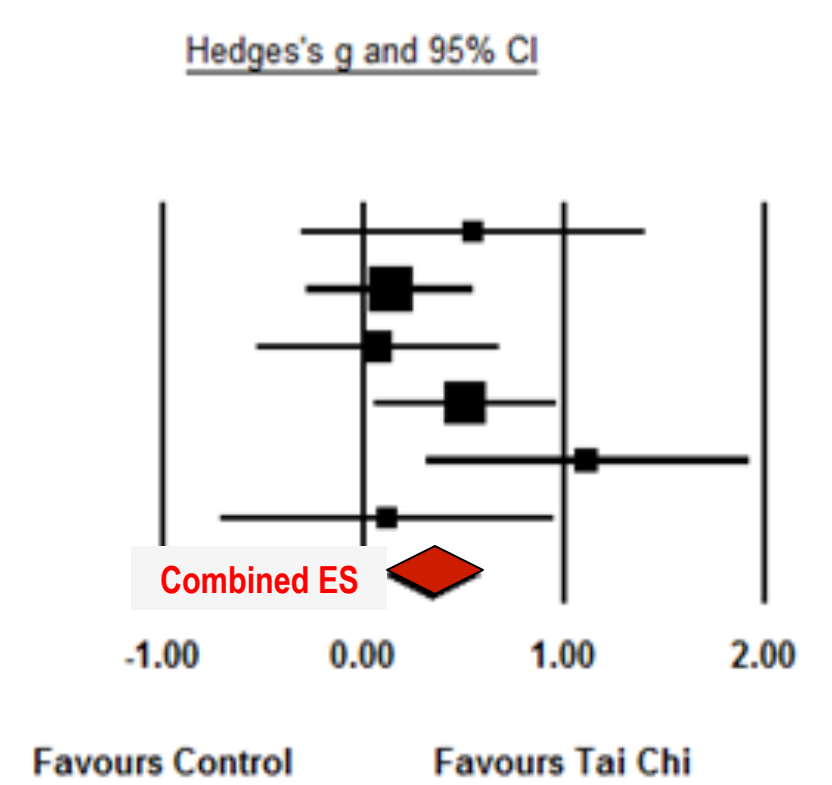
- 7 studies assessed balance using the Berg balance scale, posturography, and one leg standing time.
- Combined ES= 0.544, 95% CI 0.163 to 0.883, $p < .001$.
- Subgroup analysis with active control group (ES= 0.477, $p = .001$) and with no treatment control group (ES= 0.544, $p < .001$).
- I^2 shows no heterogeneity.



Results, continued

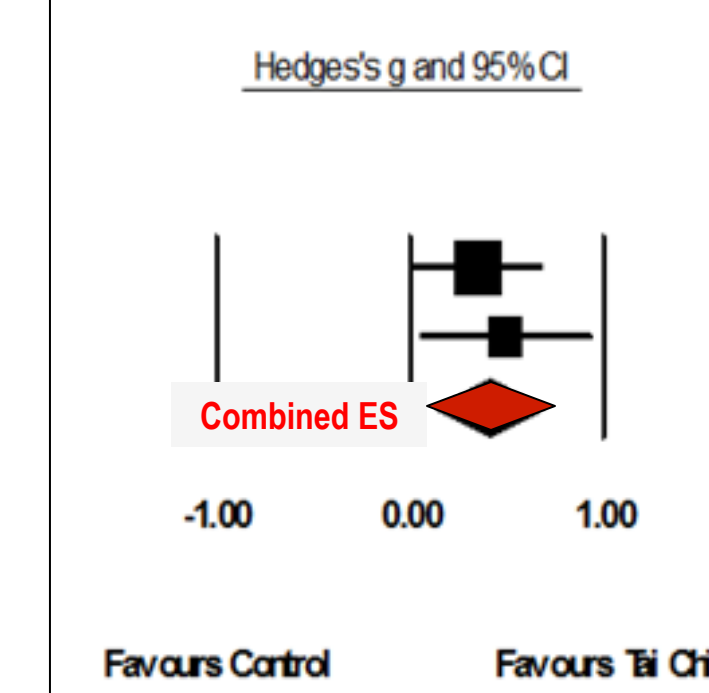
Timed Up & Go (TUG)

- 6 studies assessed TUG with combined ES=0.341, 95% CI 0.104 to 0.578, $p = .005$.
- I^2 shows no heterogeneity.



Falls

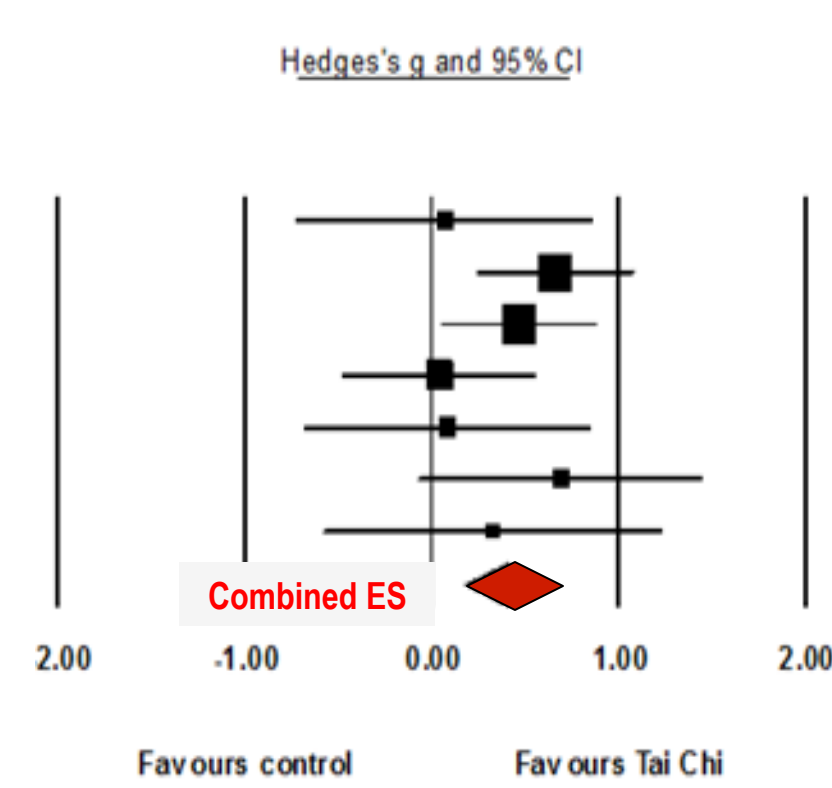
- 2 studies assessed fall episode with combined ES=0.403, 95% CI 0.129 to 0.677, $p = .004$.
- I^2 shows no heterogeneity.



Effects on Non-Motor Function

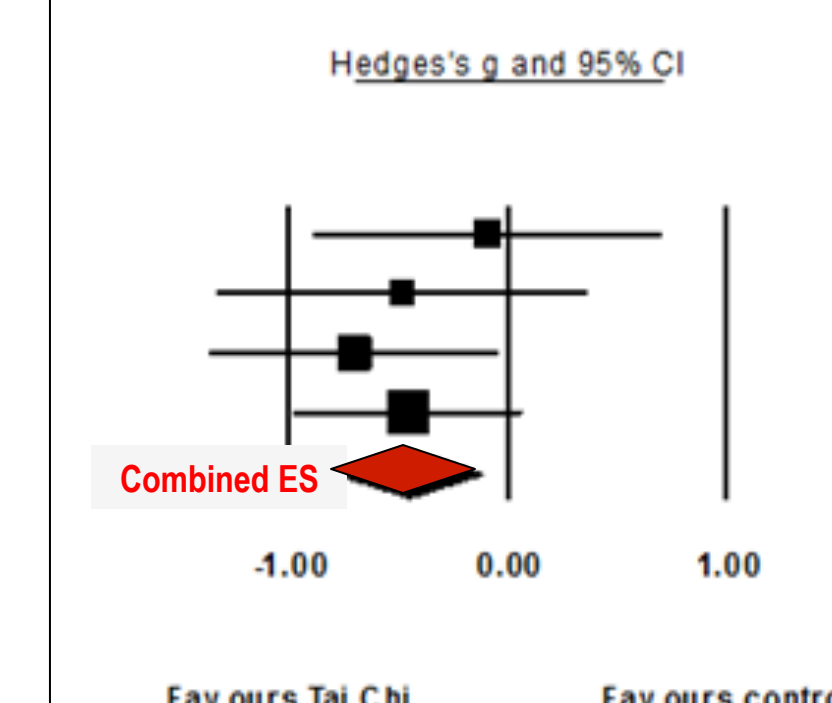
Quality of Life (QOL)

- 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, $p = .204$).
- I^2 shows no heterogeneity.



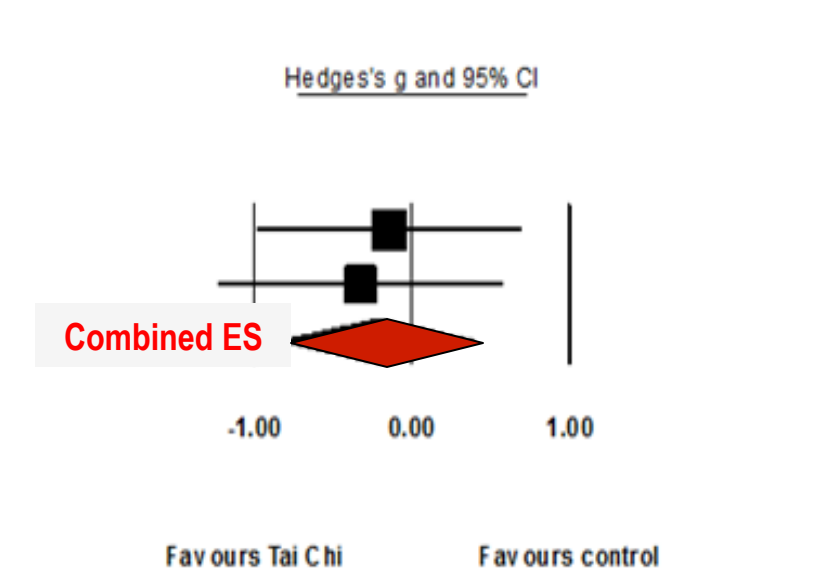
Depression

- 4 studies assessed depression with combined ES= -0.457, 95% CI -0.795 to -0.118, $p = .008$.
- I^2 shows no heterogeneity.



Cognition

- 2 studies assessed cognition with combined ES= -0.225, 95% CI -0.845 to -0.711, $p = .477$.
- I^2 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

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