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A Study On The Effects Of Tai Chi For Arthritis And Fall Prevention [TCA] On Improving Balance In Patients With Parkinson's Disease

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Abstract
Background: *Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by motor symptoms such as bradykinesia, rigidity, and postural instability. Balance impairment in PD increases fall risk and reduces quality of life. Tai Chi for Arthritis and Fall Prevention (TCA), developed by Dr.Paul Lam, is a form of Tai Chi designed to improve strength, flexibility, and balance.*
Objective: *To evaluate the effectiveness of TCA in improving balance in patients with PD.*
Methods: *A pre-post study was conducted on 35 patients diagnosed with PD (Hoehn and Yahr stages 1–3). Participants underwent a 12-week TCA program, with sessions conducted thrice weekly for one hour. Balance was assessed using the Mini-Balance Evaluation Systems Test (Mini-BESTest) at baseline and post-intervention. Statistical analysis was performed using paired t-tests.*
Results: *Significant improvements were observed in all Mini-BESTest domains post-intervention: anticipatory postural adjustments (31.18% increase, $p<0.01$), reactive postural control (29.96% increase, $p<0.01$), sensory orientation (35.72% increase, $p<0.01$), and dynamic gait (28.84% increase, $p<0.01$).*
Conclusion: *The study demonstrated that TCA is effective in enhancing balance in PD patients, suggesting its potential as a complementary intervention for fall prevention and functional mobility improvement.*
Keywords: *Parkinson's disease, Tai Chi, Balance, Fall prevention, Mini-BESTest*

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I. Introduction

Parkinson's disease (PD) is a complex neurodegenerative disorder characterized by the progressive loss of dopaminergic neurons, leading to motor and non-motor symptoms. Among the primary motor symptoms, balance impairment is a major contributor to falls, reduced mobility, and decreased quality of life [1, 2] . While pharmacological treatments can alleviate certain symptoms, they have limited efficacy in addressing postural instability [3] .

Tai Chi, a Chinese mind-body exercise, has been found to improve balance and reduce fall risk in older adults and individuals with PD [4] . The Tai Chi for Arthritis and Fall Prevention (TCA) program, developed by Dr. Paul Lam, incorporates gentle, slow, and controlled movements to enhance postural control and stability [5] . This study aims to evaluate the effects of TCA on improving balance in PD patients.

II. Materials And Methods

Study Design and Participants

A pre-post intervention study was conducted at Bethel Medical Mission Hospital and the Physiotherapy Department of Hosmat Hospital Educational Institute, Bangalore. Ethical clearance was obtained prior to the study.

Inclusion Criteria:

- Diagnosed with PD (Hoehn & Yahr stages 1–3)
- Aged ≥50 years
- Able to follow commands

Exclusion Criteria:

- Bedridden patients

- Severe cognitive impairment
- Patients involved in structured balance training in the past 3 months

Intervention

Participants underwent a 12-week TCA program, with sessions conducted thrice weekly for one hour. The intervention included warm-up exercises, Tai Chi movements, and cool-down exercises.

Outcome Measures

Balance was assessed using the **Mini-BESTest**, which evaluates four domains:

1. **Anticipatory Postural Adjustments**
2. **Reactive Postural Control**
3. **Sensory Orientation**
4. **Dynamic Gait**

Statistical Analysis

Paired t-tests were used to compare pre- and post-intervention scores. Data analysis was performed using SPSS 23, with a significance level set at $p<0.05$.

III. Results

A total of 35 participants were included, with 4 dropouts. The mean age of participants was 67.03 ± 7.49 years, with 54.3% males and 45.7% females.

Table 1: Mini-BESTest Scores Pre- and Post-Intervention

Parameter	Pre-Test Mean ± SD	Pre-Test Mean ± SD	Pre-Test Mean ± SD	Pre-Test Mean ± SD	Improvement
Anticipatory	3.89 ± 1.83	3.89 ± 1.83	3.89 ± 1.83	3.89 ± 1.83	31.18%
Reactive postural control	3.03 ± 1.69	3.03 ± 1.69	3.03 ± 1.69	3.03 ± 1.69	29.96%
Sensory orientation	2.83 ± 1.74	2.83 ± 1.74	2.83 ± 1.74	2.83 ± 1.74	35.72%
Dynamic gait	4.86 ± 2.57	4.86 ± 2.57	4.86 ± 2.57	4.86 ± 2.57	28.84%

IV. Discussion

Our study demonstrated that TCA significantly improves balance in PD patients across all domains of the Mini-BESTest. The greatest improvement was observed in sensory orientation, which aligns with previous research indicating Tai Chi enhances proprioception and visual feedback [6].

Tai Chi emphasizes slow, controlled movements, enhancing neuromuscular coordination [7]. Studies have reported that Tai Chi training increases synaptic plasticity and dopamine synthesis, which may explain improvements in balance [8, 9].

Previous randomized controlled trials have shown that Tai Chi reduces fall rates in PD patients by 47% [10]. The TCA program, with its focus on weight shifting, step adjustments, and controlled breathing, aligns with these findings.

V. Limitations And Recommendations:

This study excludes a control group and future research should assess long-term adherence and effectiveness in larger cohorts.

VI. Conclusion

This study provides strong evidence supporting the use of Tai Chi for Arthritis and Fall Prevention (TCA) in improving balance in PD patients. TCA is a safe, cost-effective, and accessible intervention that can significantly improve balance and reduce fall risk and enhance functional independence.

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