

TURO (QI DANCE) PROGRAM FOR PARKINSON'S DISEASE PATIENTS: RANDOMIZED, ASSESSOR BLIND, WAITING-LIST CONTROL, PARTIAL CROSSOVER STUDY



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Context: Qigong, Tai-chi and dancing have all been proven effective for Parkinson's disease (PD); however, no study has yet assessed the efficacy of Turo, a hybrid qigong dancing program developed to relieve symptoms in PD patients.

Objective: To determine whether Turo may provide benefit in addressing the symptoms of PD patients.

Design: Randomized, assessor blind, waiting-list control, partial crossover study.

Setting: Kyung Hee University Korean Medicine Hospital, Seoul, Republic of Korea.

Participants: A total of 32 PD patients (mean age 65.7 ± 6.8).

Intervention: Participants were assigned to the Turo group or the waiting-list control group. The Turo group participated in an 8-week Turo training program (60-minute sessions twice a week). The waiting-list control group received no additional treatment during the same period; then underwent the same 8-week Turo training.

Outcome Measures: The primary outcome was a score on the Unified Parkinson's Disease Rating Scale (UPDRS), and the secondary outcomes included the perceived health status assessed using the Parkinson's disease Quality of Life questionnaire (PDQL), balance function as assessed by the Berg Balance Scale (BBS) and the results of the Beck Depression Inventory (BDI).

Results: The Turo group showed statistically significant improvements in the UPDRS ($P < 0.01$) and PDQL ($P < 0.05$) as compared to the control group. The changes in BBS scores displayed a tendency toward improvement, but was not statistically significant ($P = 0.051$).

Conclusion: These findings suggest that Turo PD training might improve the symptoms of PD patients.

Keywords: Complementary and alternative medicine, Parkinson's disease, UPDRS, Qigong, Turo

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INTRODUCTION

Parkinson's disease (PD) is a neurodegenerative disease accompanied by the death of nigrostriatal dopaminergic neurons leading to severe problems in motor function.¹ The most common clinical features of the disease include difficulties in starting movements (akinesia), slowness (bradykinesia), a reduced ability to switch between different coordination patterns (set shifting), and stiffness in arms, legs and trunk (rigidity).² Motor symptoms of PD account for a large part of the morbidity of the disease, but non-motor symptoms such as pain/aching, anxiety, cloudy thinking, numbness, and fatigue also cause disabilities and therefore impact the quality of life in these patients.³

The treatment of PD involves not only drug therapy but also counseling, allied health intervention and commonly, the management of cognitive and psychiatric co-morbidity.⁴ Since there is no complete cure for PD to date, the treatment is mainly focused on the delay of disease progression and the reduction of symptom severity, which includes helping PD patients to move with more ease and to lead independent

lives. The chronic and debilitating symptoms of PD mean that patients often turn to complementary medicine for their alleviation.⁵⁻⁷

Qigong is a form of complementary medicine, which incorporates exercise for posture, coordination of different breathing patterns, slow and gentle movement, and meditation.⁴ Previous studies have investigated the effectiveness of qigong in PD using conventional qigong techniques, such as Tai-chi or frolic of the crane and the eight brocades (Ba Duan Jin). However, results of systematic reviews have been contradictory. While a few systematic reviews concluded that the evidence on the effectiveness of qigong in alleviating the symptoms of PD is still inconclusive,^{8,9} more recent reviews have concluded that Tai-chi was effective than the control group for improving balance and mobility outcomes.^{10,11} Another pilot trial looked into the effects of qigong exercise and concluded that qigong may also improve sleep quality and gait performance.

Dancing is another intervention that has been suggested to be a clinically meaningful method for alleviating PD symptoms while also improving quality of life. Social dancing such as tango, ballet, and weekly dance classes has been proven effective for improving rigidity, redevelopment of the social sense and increasing sense of empowerment.¹²⁻¹⁴ A recent systematic review concluded that dancing demonstrated short term clinically meaningful benefits in PD.¹⁵

However, no study up to date has combined the beneficial aspects of qigong and dancing into one specialized program for PD patients. Turo, is a form of qigong dance, and more specifically Turo PD was developed to relieve symptoms in PD patients. The development process has been fully reported elsewhere.¹⁶ The Turo PD program was completed through a four-time prototype, using Delphi methods,¹⁷ and it was constructed after collecting data on the patterns of PD patients' motor-dysfunction by observing PD patients and consulting medical specialists.

This study investigated whether adding the Turo PD program to regular pharmacological treatment can help improve physical function and symptoms in PD patients.

MATERIALS AND METHODS

Study Design

This study was designed as a randomized, blinded, waiting-list controlled partial crossover trial with two groups of patients. The patients were assigned to either the Turo PD group or the waiting-list control group using computer-generated block randomization. The assessors were blinded to the participants' treatment assignments. This investigation was approved by the institutional review board of Kyung Hee University Korean Medicine Hospital, Seoul, Republic of Korea (IRB no. 200902) and was developed in accordance with the Declaration of Helsinki. Informed consent was obtained from all participants.

Study Population

Patients were recruited from the Korean Medicine Hospital at Kyung Hee University. Thirty-two patients diagnosed with PD by a neurosurgeon participated in the study. These

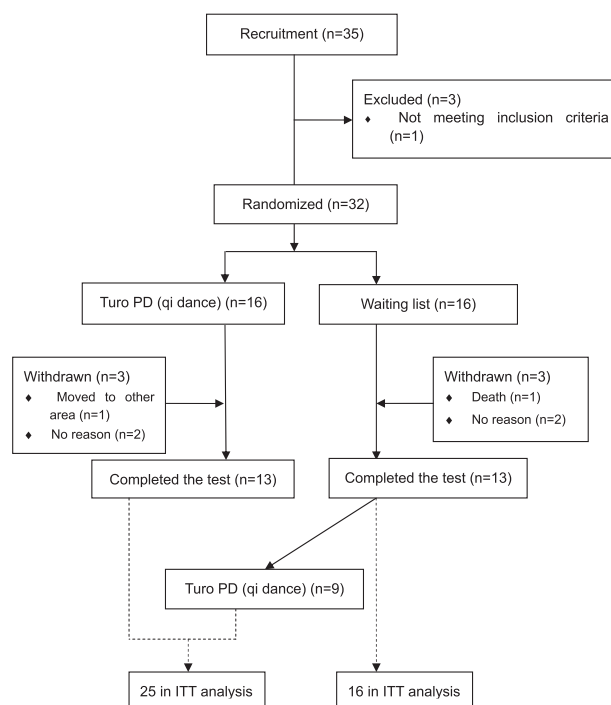


Figure 1. Flowchart for participants in the trial. ITT, Intention to treat.

patients fulfilled the following criteria: age between 50 and 80 years, stage 1–3 on the Hoehn and Yahr scales,¹⁸ no other neurological, or cognitive impairments (K-MMES > 20), and not having received any exercise therapy within the 3 months prior to the study.¹⁹ All thirty-two participants provided their informed written consent during the screening visit and understood the possibility that they might be sorted randomly into the control group. The patient flow is shown in Figure 1. During the course of the trial, three patients in the training group were withdrawn from the study: one moved to another locale and could not participate, and the other two patients were not in contact with the study coordinators. Three patients in the waiting-list group were also withdrawn: one died in a traffic accident, and the other two patients were not in contact with the study coordinators.

Study Procedure

Before beginning the intervention, every patient was assigned to either the Turo PD group or the waiting-list control group by a Korean Medicine doctor who was not involved in the study. The Korean Medicine doctor was responsible for explaining the study, randomly allocating patients to the study arms, and inviting patients to participate in the trial. During the study period, all patients in both groups continued receiving their routine pharmacological treatment. The assessors were blinded to the group allocation, and they collected the data from the patients without any knowledge regarding the study's purpose or treatment methods. The Turo PD instructor was not involved in the screening, assessment or randomization procedure, and the Turo PD group participated in an 8-week Turo program consisting of 60-minute sessions twice a week. The waiting-list group

received no intervention except for their routine pharmacological treatment during the study period. After the first 8-week intervention study, the waiting-list control group was offered the same training as the treatment group.

Study Intervention

Procedure for Developing the Turo PD Program for Parkinson's Disease. Turo, which can be seen as a sophisticated form of dance applying the meridian Qi system, is also a type of qigong training that concentrates the consciousness on the meridian pathways to strengthen the existing flow of Qi and to simultaneously make use of the muscles related to meridian pathways.¹⁶ In the process of tailoring Turo to PD patients (Turo PD), the Delphi method was also applied. The pilot study where patients were observed, surveyed and interviewed was conducted at the Korean Medicine Hospital, Kyung Hee University. Turo PD focuses on releasing physical tension in the body, incorporating mindfulness and imagery into movement, increasing awareness of breathing and thus promoting overall relaxation of the body and mind. The range of movements the participants were capable of was determined depending on the participants' performance ability and reorganized into the preliminary set of Qigong. This regimen was revised and improved 3 times before the advanced final version was considered ready for this study.¹⁷

Turo PD Structure. Turo PD has been designed for the mitigation of PD symptoms. This training program's main objective was to induce a proper flow of Qi throughout the meridians. The principles of Qigong and meridian therapy were applied to form a practical dancing regimen for use by any PD patient. A combination of simple Qigong parts and meditation exercises was designed to be danced along with music and the combination of such deep breathing, relaxing motions, and music was aimed to mitigate both physical and psychological symptoms in PD patients. The dancing motions have also been specifically designed to be simple and easy to remember so that the patients can perform them every day without the supervision of a Qigong instructor.

The training program in the present study was arranged as follows: Turo PD was performed for one hour and repeated twice a week for a total of eight weeks. Turo PD as used in this study consisted of three parts. The first part, intended to relax the meridians, included movements that stimulate the meridians that run from the toes to the top of the head. The second part, intended to promote the circulation of Qi, was composed of breathing and Qigong movements that create harmony and balance through the circulation of Qi and blood in the meridians. The third part, intended to stabilize Qi, was a stage of finger pressure therapy and massage from derived from Daoyin medical Qigong and intended to maintain meridian stability (Table 1). All three parts are described in more detail below.

Part One: Relaxing the Meridians. There are 11 aspects of meridian relaxation. Performing them is especially helpful for patients with limited mobility, as these aspects of Turo PD are performed in a seated position. Patients are led through a stretching procedure that progresses in the following order: toes, feet, legs, hands and arms, and torso and neck. This is intended to stimulate the proper flow of Qi along the meridians of these body parts. Attention should be paid to the patient's breathing and postures throughout this level. Over time, patients will experience decreased stiffness and increased flexibility. In designing this part of the program, special attention was paid to strengthening the abdominal and torso muscles. Meridian relaxation also aims at preventing the degeneration of muscles. The exercise techniques for less-used muscles or micro-muscles were the main focus of this portion of the exercise program.

Part Two: Circulating Qi. Exercise at this level circulates Qi throughout the dorsal and lateral, right and left, interior and exterior meridians of the body. The exercise begins by circulating Qi to the lung meridian (LU), which is a central hub for the body's Qi. Once the Qi circulates through the lung meridians, it is sent to the gallbladder meridian (GB), which stabilizes psychological symptoms. Part two of the exercise was designed to focus and strengthen the Qi rather

Table 1. The Turo PD Program Sequence

	Activities	Approximate Duration (min)
Part one: Relaxing the Meridians	1-1: Take a deep breath; 1-2: Push and pull thumb; 1-3: Press soles of feet together; 1-4: Flex and relax the balls of feet; 1-5: Stimulating L1; 2-1,2: Ball hands into a fist and release; 2-3: Stretch both arms out; 2-4: Reach arms out in front of chest and push towards ground; 2-5: Reach arms out in front of chest and push towards ground with flexed hands; 3-1,2: Stretching the transverse abdominal muscles; 4-1, 2,3: Stretching the neck muscles.	15
Part two: Circulating Qi	1-1: Preparatory stance; 2-1: Warming up the lung meridian; 2-2: Suppressing the gallbladder meridian (GB); 3-1: Stimulating the three yang meridians; 3-2: Stimulating GB34; 4-1: Circulating qi through the triple energizer meridian (TE); 5-1,2: Stimulating the stomach meridian (ST); 6-1: Stopping the yin meridians; G1: Perceiving qi at PC8.	30
Part three: Stabilizing Qi	1-1,2: Rubbing the face; 1-3: Stimulating the temple meridians; 1-4: Pressing top and bottom teeth together; 1-5,6: Patting the body	15

than to control the Qi in the five viscera, for the purpose of balancing unhealthy fluctuations or lack/abundance of Qi.

Part Three: Stabilizing Qi. The final level can be described as a 'cooling-down process' performed after the stimulation and circulation of Qi in order to stabilize the Qi in the meridians. This stage can be outlined as follows: massaging the face, pressing the top and bottom teeth against one another, and patting the whole body.

Outcome Measures

Unified Parkinson's disease Rating Scale (UPDRS): The outcome variables were measured on Day 1 and again after 8 weeks. The Unified Parkinson's disease Rating Scale (UPDRS) was used as a primary outcome measure of the motor function of the participants. The UPDRS is a tool for assessing disease severity in patients with PD and consists of four parts: mental capacities, mood, activities for daily living, and motor abilities, including motor fluctuations and dyskinesias.²⁰

PD Quality of Life (PDQL): Perceived health status was measured using the Parkinson's Disease Quality of Life

(PDQL) questionnaire. The PDQL is a self-administered measure that contains 4 subscales: Parkinson's symptoms (PS-14 items), systemic symptoms (SS-7 items), social functioning (SF-7 items), and emotional functioning (EF-9 items). An overall score can be derived, with higher score indicating better perceived quality of life.^{21,22}

Beck Depression Inventory (BDI): The state of depressive mood was assessed with the Beck Depression Inventory (BDI) at different points of pharmacological intervention using a dimensional approach. The BDI-21 is a self-rated questionnaire, with a score from 0 to 3 for each item, and with a maximal score of 63 and a cutoff score for depression typically around 15.²³

Berg Balance Scale (BBS): The BBS is a 14-item test, using ordinal scoring from 0 to 4 for each item, designed to measure static and dynamic standing balance. The total score range is 0 to 56, with higher scores indicating better balance.²⁴

Statistical Analysis

The values are expressed as the mean \pm standard deviation (SD). Analysis was performed on the thirty-two participants

Table 2. Sociodemographic Characteristics

	Turo PD Training (n = 25)	Wait-list Control (n = 16)	p Value
Age	65.8 \pm 7.2	65.7 \pm 6.4	0.974
Gender (male)	10 (40%)	7 (43.8%)	
Height	160.1 \pm 8.6	160.4 \pm 6.6	0.920
Weight	61.9 \pm 7.2	62.7 \pm 6.0	0.746
BMI	24.2 \pm 2.6	24.3 \pm 1.9	0.826
H-Y stage/score, n (%)			
Grade I	7 (28%)	7 (44%)	0.361
Grade II	10 (40%)	5 (31%)	
Grade III	8 (32%)	4 (25%)	
K-MMSE	26.2 \pm 1.92	26.1 \pm 2.2	0.957
Onset (year)	4.5 \pm 3.3	4.4 \pm 3.0	0.878
UPDRS			
Mentation and mood	1.8 \pm 1.4	1.7 \pm 1.1	0.794
Activities of daily living	10.3 \pm 4.0	9.5 \pm 2.5	0.489
Motor examination	14.8 \pm 6.7	11.9 \pm 3.1	0.117
UPDRS Total	26.9 \pm 9.8	23.1 \pm 4.8	0.213
PDQL			
Parkinson's symptoms	53.8 \pm 8.8	55.6 \pm 7.8	0.502
Systemic symptoms	25.1 \pm 6.5	26.3 \pm 5.6	0.549
Social functioning	29.4 \pm 5.4	28.6 \pm 7.1	0.657
Emotional functioning	34.4 \pm 6.6	31.3 \pm 7.6	0.180
PDQL total	142.8 \pm 23.4	141.8 \pm 24.5	0.904
BDI	11.2 \pm 7.2	13.3 \pm 7.7	0.402
BBS	53.0 \pm 2.5	53.2 \pm 3.3	0.816

Data represents mean \pm SD, the *t*-test did not show any significant inter-group differences ($p < 0.05$). **H-Y stage:** The Hoehn and Yahr scale is a commonly used system for describing how the symptoms of Parkinson's disease progress. **UPDRS:** Unified Parkinson Disease Rating Scale. **PDQL:** Parkinson's Disease Quality of Life Questionnaire, **BDI:** Beck depression inventory, **BBS:** Balance function by assessing the performance of functional tasks.

who were randomized for the intention-to treat analysis. Independent *t*-test was used to compare the changes in scores between the groups. Differences were considered statistically significant at $P < 0.05$. Statistical analysis was performed using the Statistical Package for Social Sciences for Windows version 18.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Sociodemographic Characteristics

The study was carried out from June to September 2009. Recruitment ended when there were no more volunteers. The study population had a mean age (SD) of 65.7 (6.8) years and were mostly female (58.5%). The baseline characteristics of the patients are presented in Table 2. The baseline characteristics were not significantly different between the Turo PD group and the waiting-list control group. Ultimately, 22 of 25 total patients in the Turo PD group and 13 of 16 patients in the control group completed the final examinations and questionnaires. There were no reported falls or unwanted harms during lessons in either groups.

Primary Outcome Measures

The changes in UPDRS for each group were compared before and after the eight-week training program. There were significant differences between the two groups after treatment on two subscales of the UPDRS score. The Turo PD group showed significant improvements in the UPDRS total score compared with the control group (changes in UPDRS total, Turo PD versus waiting-list control: -6.2 ± 7.2 versus 3.2 ± 5.9 , $P < 0.001$ by independent *t*-test). On two subscales (Activities of Daily Living, Turo PD group versus waiting-list control: -0.2 ± 0.8 versus 1.1 ± 1.6 , $P = 0.002$ and Motor Examination, Turo PD group versus waiting-list control: -0.9 ± 1.2 versus 0.9 ± 2.6 , $P = 0.004$), the Turo PD group showed significant improvements compared to the waiting-list control group (Table 3).

Secondary Outcome Measures

The secondary outcome findings of the studies are summarized in Table 4. After treatment, there were significant differences between the two groups, indicating that PDQL total score (changes in PDQL total, Turo PD versus waiting-list control: 1.8 ± 16.1 versus -9.2 ± 17.9 , $P = 0.049$ by independent *t*-test), systemic symptoms and social functioning (among 4 sub-scales assessing the PDQL) were improved in the Turo PD group ($P = 0.037$ and $P = 0.007$, respectively). These results are shown in Table 4. There was no significant intergroup difference in the balance function assessed by the Berg Balance Scale (BBS), even though it showed a remarkable tendency towards improvement (Table 4).

DISCUSSION

Turo PD, a special qigong dancing program tailored to PD patients, was developed based on the symptoms of PD patients and the theory of traditional East Asian medicine. After eight weeks of training, the results showed that there

Table 3. Primary Outcome Measures for the Turo PD and Wait-list Control Groups

	Turo PD Training (<i>n</i> = 25)	Wait-list Control (<i>n</i> = 16)	<i>p</i> Value
<i>Mentation and mood</i>			
week 0	1.8 ± 1.4	1.7 ± 1.1	
week 8	1.6 ± 1.4	1.8 ± 1.3	
Δ	-0.2 ± 0.7	0.1 ± 0.5	0.086
<i>Activities of daily living</i>			
week 0	10.3 ± 4.0	9.5 ± 2.5	
week 8	10.0 ± 3.8	10.5 ± 2.9	
Δ	-0.2 ± 0.8	1.1 ± 1.6	0.002*
<i>Motor examination</i>			
week 0	14.8 ± 6.7	11.9 ± 3.1	
week 8	13.8 ± 6.9	12.8 ± 4.2	
Δ	-0.9 ± 1.2	0.9 ± 2.6	0.004*
<i>UPDRS total</i>			
week 0	38.9 ± 13.5	34.3 ± 7.2	
week 8	32.7 ± 14.8	37.5 ± 9.2	
Δ	-6.2 ± 7.2	3.2 ± 5.9	0.001*

Data represents mean ± SD, and analyzed by independent *t*-test. Δ is the score at eight weeks minus the baseline. UPDRS: Unified Parkinson Disease Rating Scale.

were significant improvements in the overall UPDRS score. The scores that measure activities for daily living, motor examination and quality of life were also maintained without worsening in the Turo PD group. These positive results suggest that the Turo PD program may be utilized as a cost-effective and efficient rehabilitative treatment program for PD patients and to manage their symptoms.

PD is a neurodegenerative disease accompanied by the death of nigrostriatal dopaminergic neurons leading to severe problems in motor function. Many treatment approaches of PD have therefore attempted to slow down symptom progression or to improve the patients' overall conditions. Rehabilitative treatment programs, including qigong, dancing, exercise, and physiotherapy, have been applied to PD patients, and trials have shown that these exercises could help PD patients.²⁵⁻³⁰

Despite the evidence, however, PD patients have difficulty following a general and routine exercise program due to their trouble with movement. Furthermore, the effectiveness of various exercise programs has not been systematically evaluated in the context of Parkinson's disease. A specific and elaborate exercise program must consider the particular experience and symptoms of PD patients.

Qigong is one form of complementary medicine, which incorporates exercise for posture, coordination of different breathing patterns, slow and gentle movement, and meditation. It combines deep breathing and relaxation with slow and gentle movements.³¹ It has been reported that qigong has beneficial effects in reducing high blood

Table 4. Secondary Outcome Measures for the Turo PD and Wait-list Control Groups

		Turo PD Training (<i>n</i> = 25)	Wait-list Control(<i>n</i> = 16)	<i>p</i> Value
PDQL				
Parkinson's symptoms	week 0	53.8 ± 8.8	55.6 ± 7.8	0.149
	week 8	55.0 ± 7.7	52.8 ± 6.9	
	Δ	1.23 ± 9.5	-2.82 ± 7.2	
Systemic symptoms	week 0	25.1 ± 6.5	26.3 ± 5.6	0.037*
	week 8	26.5 ± 6.1	24.4 ± 6.2	
	Δ	1.4 ± 4.7	-1.87 ± 4.9	
Social functioning	week 0	29.4 ± 5.4	28.6 ± 7.1	0.007*
	week 8	29.9 ± 3.9	25.01 ± 6.0	
	Δ	0.5 ± 3.8	-3.4 ± 5.0	
Emotional functioning	week 0	34.4 ± 6.6	31.3 ± 7.6	0.916
	week 8	33.0 ± 7.7	30.2 ± 7.4	
	Δ	-1.4 ± 8.8	-1.1 ± 6.8	
	week 0	142.8 ± 23.4	141.8 ± 24.5	
PDQL Total	week 8	144.6 ± 20.9	132.6 ± 22.3	0.049*
	Δ	1.8 ± 16.1	-9.2 ± 17.9	
BDI	week 0	11.2 ± 7.2	13.3 ± 7.7	0.224
	week 8	11.4 ± 7.6	16.0 ± 7.9	
	Δ	0.2 ± 6.2	2.8 ± 7.4	
BBS	week 0	53.0 ± 2.5	53.2 ± 3.3	0.051
	week 8	53.9 ± 2.4	52.8 ± 3.4	
	Δ	0.8 ± 2.2	-0.4 ± 1.5	

pressure, improving balance and muscle strength, treating chronic diseases and preventing falls.^{32–35} Recent systematic reviews looking into the effects of qigong for PD patients have concluded that it could improve sleep quality and gait performance, while Tai-chi could effectively improve balance and mobility.^{10,12}

Similar to qigong, social dancing has also shown positive results for improving the symptoms and quality of life in PD patients. Studies suggest that weekly classes of tango or ballet can improve rigidity, help patients redevelop social senses, and to heighten their sense of empowerment.^{12–14}

However, it is not easy for PD patients to learn conventional qigong techniques such as Tai-chi, frolic of the crane or the eight brocades (Ba Duan Jin). For example, patients with motor-disorders are not able to stand and perform the required movements for a long time (more than 30 minutes), and following the movements without any preparatory steps can be difficult for the patients. Therefore it has been pointed out that the development of a systematic and patient-focused Qigong therapy is necessary and should be performed with consideration of the disease's particular associated issues.¹⁷ As for dancing, patients from countries and cultures that are less exposed to social dancing may find ballet or tango uncomfortable or difficult to learn.

This study was aimed to evaluate the improvements of symptoms in PD patients using Turo PD, an elaborate hybrid program of qigong and dance movements, specifically developed for PD patients to practice on their own or with others. It was developed with much consideration of the many symptoms of PD and the care-principle in alternative medicine. Our findings showed that the Turo PD program, tailored to PD patients, contributed to significant improvements in the UPDRS scores (overall UPDRS, activities for daily living, and motor examination scores) compared with the scores of the control group. Since an improvement of 4.3 on the UPDRS total score is regarded as a minimal clinically important difference in PD patients,³⁶ the average change of 6.2 ± 7.2 in our Turo PD group was a clinically significant improvement.

Quality of life was maintained without worsening in the Turo PD group. In contrast, the participants in the control group generally displayed decreased motor function and quality of life during the initial eight-week period when the Turo PD program was not available to them. Depression was assessed by Beck's Depression Inventory, and balance function was assessed by the Berg Balance Scale. There were no significant intergroup differences in depression (*P* = 0.224) or balance function (*P* = 0.051). However, balance function and depression worsened in the waiting-list control group, while

these factors were maintained without worsening for eight weeks in the Turo PD group. No adverse events were reported in the study participants, indicating that Turo PD is a safe therapy for patients with PD.

Nevertheless, this study has several limitations including small sample size, low-frequency training schedule (twice a week), and the use of a waiting-list control group without similar or placebo controlled groups. Participants with PD stages ranging from H-Y stage one to three were mixed in the results and there were some retention issues with patients. It would have been interesting to look at changes between the different stages. Also, this study looked at symptom improvement of PD patients while conventional pharmacological treatment was maintained. Yet in a hospital setting, it was implausible to wane patients off their medication without any prior studies on Turo PD programs.

Future studies will need to consider a larger number of patients, an appropriate control group and long-term training periods in order to further elucidate the beneficial effects of engaging in Turo PD for PD patients. A comparative study between Turo PD program and qigong or dancing would also help elucidate whether combining the positive aspects of both qigong and dancing had synergistic effects. A qualitative study to examine the social, physical, and psychological effects would also help researchers better understand and improve the treatment program in the future.

CONCLUSIONS

In conclusion, the Turo PD training group showed significant improvements in the activities of daily living, motor examination, and overall UPDRS score. Systemic symptoms and social functioning as evaluated by the PDQL were similar in both groups. These results suggest the possibility of using the Turo PD program as a supplemental therapy for PD patients.

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