뇌신경재활

발표일시 및 장소: 10 월 18 일(금) 15:25-15:35 Room B(5F)

OP2-2-8

Effects of the cognitively challenging exercise on balance and cognition in Parkinson's disease

Se Hee Jung[1*], Fay Horak[2†]

Seoul National University Boramae Medical Center, Department of Rehabilitation Medicine[1], Oregon Health & Science University, Portland, OR USA, Department of Neurology[2]

Objectives

To investigate whether people with Parkinson's disease (PD) can benefit from a cognitively challenging exercise regarding motor and cognitive function

Methods

Eighty-two subjects with idiopathic PD (54 males; mean age 68.9±7.7 years; mean Hoehn and Yahr stage 2.3 ± 0.6; mean disease duration 6.4±5.0 years) participated in a cross-over, randomized, double-blind, controlled study (Table 1). They were randomized into either a 6-week exercise (n=44) or a 6-week education (n=38) intervention (Figure 1). After the first intervention, they crossed over to the other treatment for 6 weeks. The exercise intervention was an 80-minute, 3 days a week cognitively-challenging group (up to 6) exercise program. It was based on the Agility Boot Camp-Cognition (ABC-C) program led by an exercise trainer. The exercises were designed as a circuit to challenge movement skills known to be impaired in PD and each activity was systematically progressed for 3 levels integrated with various cognitive tasks. The education intervention was a 90-minute, once a week group (up to 6) program developed to be specific for people with PD. Clinical assessment and outcome measures were performed at baseline (T0), after 6 weeks of the first intervention (T1), and at the end of the second intervention (T2).

Results

The motor dual-task cost (DTCmotor) on gait speed and stride length improved after exercise (5.1±1.1%, 4.0±1.3%), but not after education (0.3±1.1%, 1.0±1.0%, Figure 2). The MDS-UPDRS Part II score improved after exercise (-1.3±0.4) more than after education (0.04±0.4, p=0.03). The PIGD score decreased after exercise (-0.9±0.2) more than after education (-0.2±0.2, p=0.02). The anticipatory postural adjustment subscore of the Mini-BESTest improved after exercise (0.3±0.1) more than after education (-0.3±0.1, p=0.003). The SCOPA-COG total score showed a significant improvement after exercise (1.6±0.3) than after education (0.5±0.4, p=0.045). Participants who did light intensity exercise or exercise for less than 3 hours before trial showed significant improvement in DTCmotor on gait speed and stride length and SCOPA-COG total score after exercise. Freezers showed

significant improvement in DTCmotor on gait speed ($p<0.001$) and stride length ($p=0.047$) after exercise. Individuals who had cognitive impairment showed significant improvement in DTCmotor on gait speed ($p=0.001$) and stride length ($p=0.001$) after exercise.

Conclusions

People with PD can improve the dual-task performance, motor function and cognitive function with a cognitively challenging group exercise intervention.

Acknowledgment: This study was supported by NIH (R01AG006457, Horak), Department of Veterans Affairs (5I01RX001075, Horak), and National Research Foundation of Korea grant funded by the Korea government (2015R1C1A1A02037513, Jung).

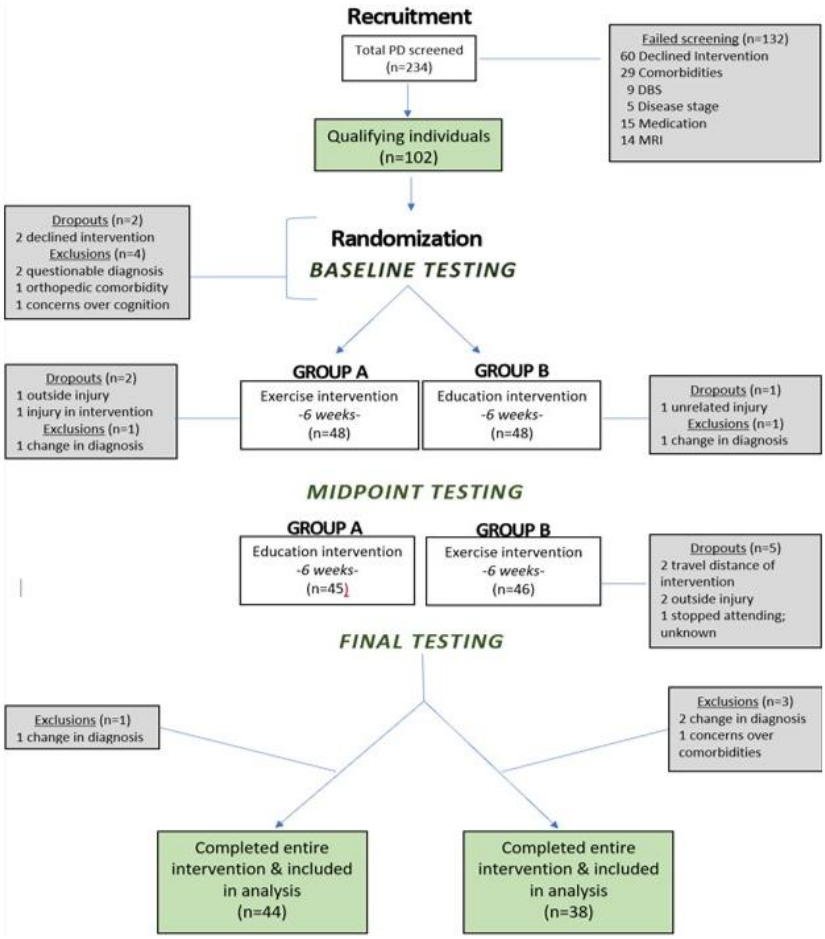

Fig. 1 CONSORT diagram of the study

Table 1. Baseline demographic data.

	All (N = 82)		Group A (N = 44)		Group B (N = 38)		p-value
	Mean	*SD*	Mean	*SD*	Mean	*SD*	
Male/Female	54/28		30/14		24/14		*0.632* [b]
Age (yrs)	68.9	7.7	67.7	6.8	70.4	8.4	*0.112*
Disease Duration (yrs)	6.4	5.1	6.3	4.4	6.6	5.8	*0.730*
Hoehn & Yahr stage (N: I / II / III / IV)	1/ 65/ 9/ 7		1/ 38/ 4/ 1		0/ 27/ 5/ 6		*0.105* [b]
MDS-UPDRS							
Total	68.9	20.2	67.4	20.1	71.0	20.6	*0.452*
Part I	10.2	5.8	10.21	5.182	10.2	6.7	*0.963*
Part II	14.1	7.2	14.5	7.5	13.6	7.0	*0.582*
Part III	42.2	12.1	40.7	11.2	43.8	13.0	*0.247*
Part IV	3.1	3.4	2.6	3.0	3.8	3.8	*0.106*
PIGD score	5.4	2.9	4.9	2.5	5.9	3.2	*0.111*
Mini-BEST							
Total	18.0	4.8	18.6	4.4	17.2	5.2	*0.180*
APA	3.5	1.4	3.5	1.3	3.5	1.4	*0.747*
APR	3.6	1.6	3.9	1.6	3.3	1.5	*0.134*
Sway	5.0	1.3	5.2	1.1	4.8	1.5	*0.214* [a]
Gait	5.8	1.8	6.0	1.8	5.6	1.8	*0.266*
NFOGQ	14.3	5.3	13.8	5.9	15.0	4.2	*0.370*
FoG+/FoG-	38/44		23/21		15/23		*0.246* [b]
ABC scale	80.2	16.2	79.8	18.0	80.6	14.0	*0.830*
MoCA	25.7	3.6	26.5	2.9	24.7	4.0	*0.020*
SCOPA-COG	28.2	4.9	28.8	4.9	27.6	4.9	*0.290*
Apathy score	11.0	5.3	10.5	5.1	11.6	5.6	*0.375*
PDQ-39 summary index	16.3	11.7	16.7	11.5	15.9	12.1	*0.770*
Exercise intensity (N: Low/Moderate)	52/30		29/15		23/15		*0.614* [b]
Weakly exercise hours	4.2	3.6	3.9	3.3	4.6	3.8	*0.435*

Groups compared using independent sample t-test, Mann-Whitney U test or Chi-squared test and significance level of 0.01 (a: Mann-Whitney U test, b: Chi-squared test).
Bold values indicate significant differences between groups (Control and PD or Group A and Group B).
PD, Parkinso's disease; MDS-UPDRS, Movement Disorder Society-Sponsored Revision of the Unified Parkinson's Disease Rating Scale, PIGD, Postural Instability and Gait Disability; Mini-BEST, Mini Balance Evaluation Systems Test; APA, Anticipatory Postual Adjustment; APR, Automatic Postural Response; QS, Quiet Stance; GAIT, dynamic GAIT; ABC scale, the Activities-specific Balance Confidence scale; PDQ-39, Parkinson's Diseease Questionnaire-39; ADL, Activities of Daily Living; MoCA, Montreal Cognitive Assessment; SCOPA-COG, Scales for Outcomes in Parkinson's disease-Cognition; NFOGQ, New Freezing of Gait Questionnaire; FoG, Freezing of Gait

Fig. 2

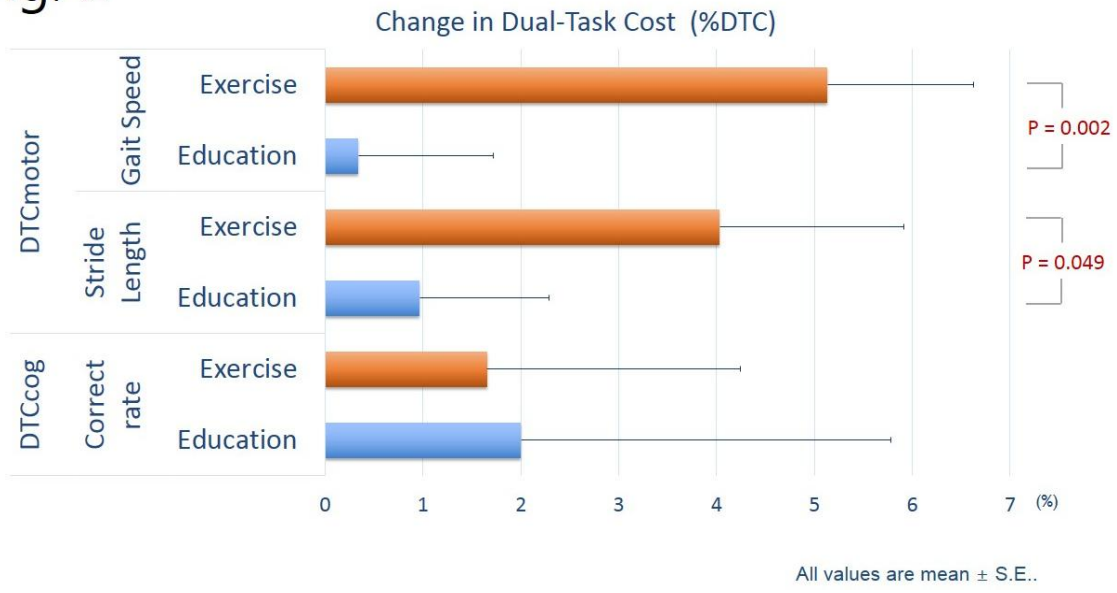

fig.2 Change of the motor and cognitive dual-task cost after exercise and education intervention.