ELECTROMYOGRAPHY AND KINEMATIC CHARACTERISTICS OF OBSTACLE GAIT IN ELDERLY PARKINSON'S PATIENTS

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INTRODUCTION: Falls associated with tripping over an obstacle can be dangerous, yet little is known about the strategies used for stepping over obstacles in elderly Parkinson's patients. The purpose of this study was to investigate the lower extremity muscle activity and kinematics of obstacle gait in Parkinson's patients.

METHOD: The gait of 7 Parkinson's patients was examined during a 5.0 m approach to, and while stepping over, obstacles of 0, 25, 52, and 152 mm. Seven pairs of surface electrodes (Noraxon MyoResearch, USA) were attached to the affected side of the body to monitor the adductor longus (AL), gluteus medius (GME), gluteus maximus (GMA), biceps femoris (BF), rectus femoris (RF), gastrocnemius (GA), tibialis anterior (TA). Electromyography data were filtered using a 10Hz low pass digital filters and normalized to the maximum value in the analyzed phases. A one-way ANOVA for repeated measures was employed for selected electromyography and kinematical variables to analyze the differences between the four obstacle heights.

RESULTS: The results showed significant differences between obstacle heights and approach speed (AS), foot clearance (FC), step width (SW), knee angle (KA) and ankle angle (AA), as shown in Table 1. The Parkinson's patients tended to step over the obstacle slowly and inefficiently. The results showed significant differences between 0.0mm and 25, 52, and 152mm obstacle height in TA and GA activities during the swing phase. Just because the obstacle was higher it didn't mean an increase the muscle activities.

CONCLUSION: Subjects with Parkinson disease step over obstacles inefficiently. To prevent and reduce the frequency of falls, elderly Parkinson must maintained and improve their balance, increase muscular strength, neuromuscular control and mobility.

Table 1 Kinematical Variables

	Obstacle Height (mm)			
	0 (H0)	25 (H1)	52 (H2)	152 (H3)
AS(㎧)	0.61 ± 0.27	0.60 ± 0.21	0.55 ± 0.21*	0.51 ± 0.24*†
CS(㎧)	0.59 ± 0.32	0.59 ± 0.20	0.59 ± 0.21	0.49 ± 0.11
FC(㎝)	4.01 ± 3.01	8.98 ± 2.24	9.41 ± 1.20	11.89 ± 1.66 *†
TD(㎝)	23.12 ± 4.93	23.91 ± 3.92	24.05 ± 5.54	24.28 ± 3.05
HD(㎝)	13.87 ± 9.09	10.33 ± 6.11	18.87 ± 8.31	15.18 ± 5.44
KA(°)	135.93 ± 8.86	133.99 ± 6.33	124.68 ± 4.21	105.87 ± 15.99*†
AA(°)	107.48 ± 5.95	103.46 ± 3.29	97.83 ± 5.91*†	94.82 ± 1.15*†
SW(㎝)	21.19 ± 4.12	21.86 ± 2.82	23.72 ± 4.54	27.25 ± 3.56*†‡

* Difference with 0mm. † Difference with 25mm. ‡ Difference with 52mm.*†‡p<.05