DUAL-TASK PROGRAM TRAINING IN PATIENTS WITH ACQUIRED BRAIN INJURY

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OBJECTIVES

1.- To identify difficulties with dual task performance in relation to static standing balance in patients with Acquired Brain Injury (ABI).
2.- To evaluate the effect of task-specific balance training under dual-task conditions in patients with ABI.

METHODS AND MATERIALS

Study Design
A double-blind, randomized controlled trial

Subjects
9 ABI patients in rehabilitation, with balance disorders, ages 16-50, randomized to two treatment groups

Inclusion Criteria
Motor
•Independent community ambulation (no external devices or support)
•No previous neurological or musculoskeletal impairments
•Force platform: able to stand eye-opened on an uneven surface (foam)
•No lower limb motor disorders impeding complete plantard support on foam (equinus deformity needing ankle foot orthosis)

Cognitive
•Ability to understand and follow instructions
•Preserved language comprehension and production

Assessment Protocol

Scales
1./ Berg Balance Scale: measuring static and dynamic balance in 14 tasks with scores ranging 0-4 (total 0-56)
2./ Activities-Specific Balance Confidence (ABC) Scale: subjective, self/report (patient) of perceived safety while carrying out different activities

Posturograph Measures
Balance Master (8.0.3) Neurocom System: Total displacement from the centre of pressure (COP) and the swept area.

ROMB_FI: **Romb**erg Task in **Fi**rm surface
ROMB_FO:**Romb**erg Task in **Fo**am surface
VIS_FI: Romberg+**Vis**ual Cognitive Task in **Fi**rm surface
VIS_FO: Romberg+**Vis**ual Cognitive Task in **Fo**am surface
AUD_FI: Romberg+**Aud**itory Cognitive Task in **Fi**rm surface
AUD_FO:Romberg+**Aud**itory Cognitive Task in **Fo**am surface

Treatment Groups

•12 weeks (3 times/week, 4 weeks)
•30 min sessions
•Foam Surface
•2 min tasks

Randomization into two treatment conditions

Simple-Task Condition (n=3)	**Dual-Task Condition (n=6)**
Balance Training	Balance Training+Cognitive Task

Balance Training		**Cognitive Task**
Postural Stability	•Upright stance, foot together, eyes open/closed •Tandem stance, eyes open/closed	•Associated words •Numbers 2-2 •Numbers 3-3
Postural Stability + Manipulation	•Upright stance, foot together + ABD-ADD shoulders •Upright stance, foot together picking up objects from the floor	•Number addition
Body Displacement	•Narrow based walk •Walk backwards •Walk eyes closed	•Associated words •Numbers 2-2 •FAS Semantic
Body Displacement		•Backward count •FAS Semantic

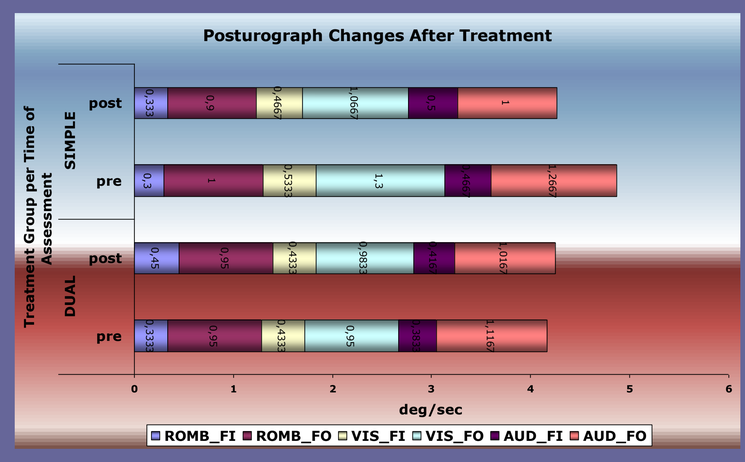
RESULTS

I) Demographics

Variables	***Dual***			***Simple***			***Analysis***		
	n	Mean	SD	n	Mean	SD	statistic	df	p
Age (years) 35.62+9.5	6	36	10.5	3	34.67	10.6	U	-	1.00
Time of evolution (months) 8.08±3.2	6	8.83	1.7	3	5.67	1.16	U	-	**0.24**
	n	%[1]	-	n	%[1]	-	statistic	df	p
Sex	6	100.0	-	3	100	-	χ^2	1	1.00
Male - 6	4	66.7	-	2	66.7	-			
Female - 3	2	33.3	-	1	33.3	-			
Etiology	6	100.0	-	3	100	-	χ^2	2	0.687
Severe TBI	4	66.7	-	2	66.7	-			
CVA Hemorragic	1	16.6	-	1	33.3	-			
CVA Isquemic	1	16.6	-	0	0	-			

Table 1. No significant differences were observed in age, gender or time of evolution. There were significant differences in the etiology variable .

II) Posturograph Measures



Within Group Analysis
None of the posturograph measures assessed showed significant improvement after 12 week treatment on either the Dual or Simple programs (all p values > 0.05)

Between Group Analysis
There were no baseline differences on any of the dependent variables (BERG and ABC scales, Posturograph measures) between treatment programs.

Treatment group differences were NOT observed across time for any of the measures assessed.

III) Scales

CHART 1. BERG SCALE CHANGES AFTER TREATMENT

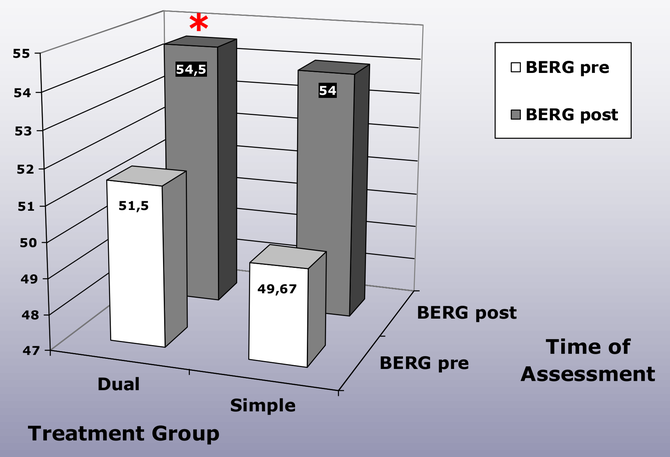


Chart 1. Significant changes on the Berg Scale scores were observed for patients treated on the Dual Program (p=0.027), but not for patients treated on the Simple Program (p=0.102)

CHART 2. ABC SCALE CHANGES AFTER TREATMENT

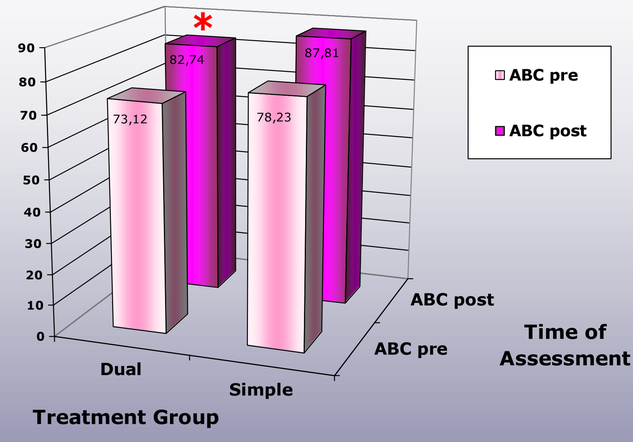


Chart 2. Patients randomized to the Dual Program significantly improved their perception of safety (p=0.028), compared to patients randomized to the Simple Program (p=0. 285)

CONCLUSIONS AND DISCUSSION

1. Patients treated on the dual-task program improved their perception of safety while performing different activities
2. Berg scale, scored by blind examiners, indicate an improvement in static and dynamic balance in patients treated in the dual-task program.
3. We were not able to evidence that the association of a cognitive task to a balance training program significantly improves balance as measured by the posturograph, when compared to simple balance training programs.
4. A bigger sample size is needed in order to establish the validity of the program of dual-task balance in this population.
5. It is necessary to design a new evaluation system of the balance function between deficit and subjective perception: i.e., virtual reality tools combined with force platforms.