

Factors influencing the gross motor outcome of hippotherapy in children with cerebral palsy

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Aim

The aim of this study was to identify individual factors influencing the gross motor outcome in children with cerebral palsy (CP) after hippotherapy.

Method

One hundred forty six children with CP (mean age: 5.78±1.72 years, male: 56.2%) presenting variable function (Gross Motor Function Classification System [GMFCS] levels I–IV) participated in this study. Participants received 30 minutes of hippotherapy twice a week for 8 weeks. Clinical information including GMFCS level, age, sex, CP distribution, CP type, Gross Motor Function Measure-88 (GMFM-88), GMFM-66, and Pediatric Balance Scale (PBS) score were collected retrospectively. We regarded the children with GMFM-66 score increased by 2.0 points as good responders to hippotherapy. Further we analyzed factors affecting good responders.

Results

GMFCS level I–II compared to IV (OR=6.83) and III compared to IV (OR=4.45) were significantly associated with a good response to hippotherapy. Higher baseline GMFM E (OR=1.05) and lower baseline GMFM B (OR=0.93) were also significantly associated with a good response to hippotherapy.

Interpretation

The children with CP, GMFCS level I–III with relatively poor postural control in sitting might have more chances to improve their GMFM-66 scores through hippotherapy. It supports that hippotherapy is a context-focused therapy to improve postural control in sitting.

Acknowledgment

This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry through Agri-Bio Industry Technology Development Program, funded by Ministry of Agriculture, Food and Rural Affairs (316086-2)

Characteristic	n (%)	Difference in GMFM-66 score		
		Mean	SD	p Value
Sex				
Male	82 (56.2%)	2.27	1.77	
Female	64 (43.8%)	2.45	2.10	0.227
Age (mean±SD, y)	5.78±1.72			
3 ≤ age < 6	77 (52.7%)	2.30	1.79	
6 ≤ age < 11	69 (47.3%)	2.40	2.07	0.199
Distribution (spastic type)	n=128			
Unilateral	12 (9.4%)	2.46	2.17	
Bilateral	116 (90.6%)	2.34	1.90	0.771
GMFCS level				
I*,†	24 (16.4%)	3.33	2.26	
II [§]	48 (32.9%)	2.82	2.07	0.020*
III [†]	44 (30.1%)	1.98	1.57	0.001 [†]
IV*, [§]	30 (20.5%)	1.35	1.17	0.004 [§]
Neuromotor type, n (%)				
Spastic	128 (87.7%)	2.32	1.94	>0.05
Dyskinetic	10 (6.8%)	2.39	1.50	>0.05
Ataxic	8 (5.5%)	2.78	2.23	>0.05

Table 1. Characteristics of the patients and the difference in GMFM-66 score among the groups (n = 146)

	Before	After	Difference	p Value
GMFM-66	59.15±12.44	61.50±13.22	2.35±1.92	0.000
GMFM-88	73.75±17.68	76.71±17.18	2.96±2.43	0.000
PBS	24.58±17.81	27.94±18.31	3.36±3.19	0.000

Table 2. Differences in GMFM-66, GMFM-88, and PBS scores between before and after intervention

Factors		Univariable logistic analysis		Multivariable logistic analysis	
		Odds ratio (95% CI)	p Value	Odds ratio (95% CI)	p Value
Sex	Boys	Reference			
	Girls	1.10 (0.57–2.12)	0.770		
Age	3 ≤ age < 6	Reference			
	6 ≤ age < 11	1.05 (0.55–2.01)	0.883		
Distribution	Unilateral	Reference			
	Bilateral	0.65 (0.20–2.16)	0.485		
GMFCS	I or II	5.81 (2.20–15.38)	0.0004	6.83 (1.03–45.09)	0.046
	III	2.28 (0.81–6.42)	0.121	4.45 (1.03–19.16)	0.045
	IV	Reference		Reference	
Neuromotor type	Spastic	Reference			
	Dyskinetic	1.07 (0.29–3.86)	0.924		
	Ataxic	1.07 (0.26–3.86)	0.932		
Baseline gross motor	Baseline GMFM A	0.93 (0.69–1.25)	0.626		
	Baseline GMFM B	1.04 (0.99–1.09)	0.124	0.93 (0.87–1.00)	0.046
	Baseline GMFM C	1.06 (1.02–1.11)	0.006		
	Baseline GMFM D	1.05 (1.02–1.08)	0.001		
	Baseline GMFM E	1.04 (1.02–1.05)	<0.0001	1.05 (1.01–1.11)	0.031
	Baseline PBS	1.04 (1.02–1.06)	0.0002		

Table 3. Factors that influence the therapeutic effect of hippotherapy