The Effects of Horseback Riding Therapy on Cognition and Language in Children with Cognitive Impairment

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Background

- ❖ Recently, there has been a growing interest in horseback riding therapy (HRT) as a rehabilitation method of various patients.
- ❖ There have been many studies focusing on motor functions of patients with cerebral palsy or intellectual disability after HRT.
- ❖ In some studies, autistic children showed greater social behavior after HRT.
- ❖ In this respect, it is assume that HRT may affect cognitive and/or language development.

Objective

- ❖ To investigate if HRT can improve language and cognitive function in children with ASD or ID

Methods

- ❖ **Study Design**
 - Prospective, case- control study
 - HRT group: Conventional therapy + HRT (30 min/week, for 8 weeks)
 - Control group: Conventional therapy only

- ❖ **Inclusion of Patients**
 - Diagnosed as ASD or ID with cognitive and/or language disorder
 - Age: 6 -13 years old
 - Body weight < 35 kg, Height > 150 cm
 - Who can understand simple instructions
 - Who are capable of rehabilitation riding

- ❖ **Assessment and Follow-ups**
 - Baseline characteristics: Age, Gender, Diagnosis
 - Pre-HRT assessment was done:
 - ✓ Cognitive function
 - ✓ K- ABC (Kaufman Assessment Battery for Children)
 - ✓ BSID-II (Mental score of Bayley Scales of Infant Development II)
 - Language function:
 - ✓ PRES (Preschool Receptive-Expressive Language Scale)
 - ✓ REVT (Receptive and Expressive Vocabulary Test)
 - ✓ M-B CDI-K (MacArthur-Bates Communicative Development Inventories- Korean version)
 - Follow-up assessment was performed within one month after the HRT was finished in HRT group. In control group, assessment was performed after 8 weeks from the initial assessment.

Results

- ✓ 18 and 11 patients were enrolled as HRT and control groups.
- ✓ There was no statistically significant difference between two groups at baseline.

Table 1. Therapeutic Effects of Horseback Riding Therapy

	N (patients)	Before HRT	After HRT	P-value *
Language				
REVT				
Reception	18	17.44±19.97	20.11±20.84	0.001*
Expression	18	14.28±20.60	17.22±24.95	0.011*
PRES				
Reception	12	21.33±13.32	23.67±13.89	0.005*
Expression	11	17.00±12.78	18.73±13.66	0.007*
M-B CDI-K (Preschooler)				
Expression	7	56.71±53.47	58.57±54.18	0.180
Grammar	7	2.00±2.52	2.14±2.55	0.317
M-B CDI-K (Infant)				
Expression	11	136.27±114.20	164.27±130.66	0.018*
Reception	11	187.09±82.37	208.82±86.33	0.028*
Gesture	11	46.73 ±21.74	50.45±23.23	0.043*
Cognition				
Cognitive Domain of BSID-II	13	130.38 ±21.87	133.69 ±23.29	0.007*
K-ABC	5	68.60 ±19.41	73.20 ±21.48	0.042*

Values are expressed as mean ± SD
* P-value <0.05 is statistically significant by Wilcoxon signed rank test.
HRT, Horesback riding therapy, REVT, Receptive and Expressive Vocabulary Test , PRES, Preschool Receptive-Expressive Language Scale, M-B CDI-K , MacArthur-Bates Communicative Development Inventories- Korean version, BSID-II , Bayley Scales of Infant Development-II, K-ABC, Kaufman Assessment Battery for Children

- ✓ In the HRT group, the result showed statistically significant improvements in most domains between pre- and post- treatment including receptive, expressive language and cognitive function except for infant scale of M-B CDI-K (Table 1).

Table 2. Comparison between Baseline and after 8 weeks Scores in Conventional Therapy Group

	N (patients)	Baseline	After 8 weeks	P-value *
Language				
REVT				
Reception	11	13.82 ±18.21	15.27 ±18.12	0.027*
Expression	11	8.82 ±17.59	9.64 ±17.62	0.257
PRES				
Reception	8	17.00 ±12.20	17.88 ±12.41	0.109
Expression	8	10.88 ±10.44	11.75 ±10.08	0.109
M-B CDI-K (Preschooler)				
Expression	2	70.00 ±21.21	70.00 ±21.21	1.000
Grammar	2	1.50 ±0.71	1.50 ±0.71	1.000
M-B CDI-K (Infant)				
Expression	9	135.67 ±109.89	141.78 ±110.57	0.068
Reception	9	180.56 ±74.60	184.78 ±72.85	0.066
Gesture	9	47.56 ±17.13	47.56 ±17.13	1.000
Cognition				
Cognitive Domain of BSID-II	9	136.00 ±19.51	138.33 ±20.20	0.042*
K-ABC	2	66.00 ±31.11	70.00 ±36.77	0.317

✓ All marker and abbreviations are same with Table 1.

- ✓ In the control group, only in receptive language function assessed by REVT and cognitive function assessed by BSID-II showed improvements, which shows lower degree than that of HRT group (Table 2).

Table 3. Comparison of Changes between Pre- and Post- Treatment in HRT and Control group

	HRT (N=18)	Control (N=11)	P-value*
Language			
REVT			
Reception	2.67 ±2.35	1.45 ±1.81	0.188
Expression	2.94 ±5.03	0.82 ±2.44	0.238
PRES			
Reception	2.33 ±1.83	0.88 ±1.46	0.069
Expression	1.73 ±1.27	0.88 ±1.46	0.129
M-B CDI-K (Preschooler)			
Expression			
Grammar	1.86 ±3.76	0.00 ±0.00	0.667
M-B CDI-K (Infant)			
Expression	0.14 ±0.38	0.00 ±0.00	0.889
Reception	28.00 ±43.08	6.11 ±9.52	0.295
Gesture	21.73 ±26.10	4.22 ±6.20	0.201
Cognition			
Cognitive Domain of BSID-II	3.73 ±6.77	0.00 ±0.00	0.095
K-ABC	3.31 ±3.88	2.33 ±3.32	0.556

✓ All marker and abbreviations are same with Table 1.

- ✓ When comparing the HRT group and the control group, the higher improvements were observed in the HRT group, but there was no statistically significant difference between two groups (Table 3).

Conclusion

- ❖ HRT group showed the improvement in most domains of language and cognitive function assessments. However comparing with control group, the improvement degree was not statistically significant. It might be due to the small sample size and short period of intervention.
- ❖ Further large-scale and long-term study would be needed to see whether HRT is one of effective methods for language and cognitive function in children with ASD or ID.