

The Effect of Morning Walk-Assisted Gait Training for Patients with Hemiparesis due to Stroke

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Background: Robot-assisted gait training is helpful in effectively implementing repetitive, high intensity gait training. Several studies revealed that a subacute stroke patients treated with an end-effector-type robotic device(Gait trainer) in combination with conventional physiotherapy resulting in greater improvement in gait function than conventional gait training alone. Morning walk, end-effector type rehabilitation robot for lower limb, has been developed in 2015, but the effect is not verified yet.

Objective: To investigate the effects of Morning Walk-assisted gait training for patients with subacute stroke.

Design: A non-blinded, prospective, and randomized controlled trial

Setting: Three hospital rehabilitation departments (two tertiary and one secondary)

Patients: We enrolled 58 patients with hemiparesis, following first-time stroke within the preceding year, whose functional ambulation category(FAC) scores were ≥ 2 . Ten patients were excluded, leaving a cohort of 48 for final analyses.

Intervention: Patients were randomly assigned to one of two groups: 28 patients were treated with 30 min of Morning Walk training plus 1 h of conventional physiotherapy (MW group), and 30 patients received only 1.5 h of conventional physiotherapy (control group). Both groups received treatment five times per week for 3 weeks.

Main Outcome Measurements: The primary outcome was the walking ability, assessed using the FAC scale, and lower limb function, assessed using the Motricity Index(MI)-Lower. Secondary outcomes included the ten-minute walk test, the Modified Barthel Index, the Rivermead Mobility Index, and the Berg Balance Scale.

Results: After training, all outcome measures significantly improved in both groups. The MW group showed greater improvement in MI-affected limb ($p = .034$) and BBS ($p = .047$) than the control group. Patients with baseline FAC scores of < 3 showed significantly greater improvement than those with FAC scores of ≥ 3 on the MBI ($p = .011$).

결과: 재활훈련 후 두그룹 모두 모든 측정항목에서 현저히 개선되었다. 모닝워크 그룹은 비교그룹에 비해 MI-affected limb과 BBS에 더 큰 개선을 보였다. FAC 3 미만의 환자군이 FAC 3이상의 환자군보다 현저히 더 큰 개선됨을 보였다.

*참고: MI : Motricity Index(운동성지수), BBS : Berg Balance Scale(베르그 균형성 척도)

FAC : Functional Ambulation Category(보행능력지수) 5개 등급으로(1~5) 낮을수록 보행능력

떨어짐.

Conclusion: Compared with conventional physiotherapy alone, Morning Walk-assisted gait training combined with conventional physiotherapy improved motricity of the affected limb and balance in patients with subacute stroke and hemiparesis. Our finding suggests that Morning walk therapy is a promising intervention for gait rehabilitation.

결론: 기존치료방법만을 사용한 것 대비, 기존치료법과 병행한 모닝워크 보행훈련이 아급성기와 편마비 환자의 운동성과 균형감을 개선했다. 우리의 발견은 모닝워크 치료법이 유망한 치료법임을 시사한다.

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Table 1. Participants characteristics in each group

	Morning walk group (n=25)	Control group (n=23)	p-value
Age (years)	57.56±12.91	60.43±13.20	.450†
Gender (n/%)			
Male	20/80	13/56.5	.083
Female	5/20	10/43.5	
Height (cm)	168.98±8.20	163.74±8.24	.032+*
Weight (kg)	68.99±10.37	60.36±11.72	.010+*
Time post-stroke (months)	1.96±2.42	2.61±3.07	.327
Stroke etiology (n/%)			
Infarction	14/56	18/78.3	.177
Hemorrhage	11/44	5/21.7	
Side of hemiparesis (n/%)			
Left	14/56	14/60.9	.735
Right	11/44	9/39.1	

Values are presented as mean±SD or as indicated

† independent T-test, otherwise Mann-Whitney U test

* p<.05

Table 2. Changes of the outcome measures in the two groups

	Difference (T ₁ -T ₀)		p-value†
	MW (n=25)	Control (n=23)	
FAC	1.04±1.06**	0.74±0.86**	.342
10mWT (m/s)	2.00±5.54**	0.35±0.48**	.391
MBI	18.36±16.60**	15.57±13.57**	.861
MI-Lower, Lt	14.20±12.95**	7.78±10.48**	.068
MI-Lower, Rt	10.60±14.42**	10.04±10.00**	.662
MI-Lower, affected limb	19.68±14.06**	11.70±10.65**	.034*
RMI	2.56±1.64**	1.83±1.23**	.146
BBS	14.36±9.01**	9.65±8.14**	.047*

Values are presented as mean±SD

T₀, before training. T₁, after training. MW, Morning walk group

FAC, Functional Ambulation Category. 10mWT, 10m Walk Test. MBI, Modified Barthel Index. MI-Lower, Motricity Index-lower. RMI, Rivermead Mobility Index. BBS, Berg Balance Scales

† Mann-Whitney U test of MW group vs. Control group

* p<.05

** p<.05, by Wilcoxon signed rank test of before vs. after training

Table 3. Changes in the outcome measures according to initial FAC in the Morning walk group

FAC of T ₀	Difference (T ₁ -T ₀)		p-value†
	<3 (n=15)	≥3 (n=10)	
FAC	1.27±1.22	0.70±0.68	.316
10mWT (m/s)	3.10±7.02	0.33±0.48	.141
MBI	24.20±16.61	9.60±12.79	.011*
MI-Lower, affected limb	22.53±14.12	15.40±13.53	.318
RMI	2.93±1.62	2.00±1.56	.179
BBS	16.73±8.71	10.80±8.66	.075

Values are presented as mean±SD

T₀, before training. T₁, after training.

FAC, Functional Ambulation Category. 10mWT, 10m Walk Test. MBI, Modified Barthel Index. MI-Lower, Motricity Index-lower. RMI, Rivermead Mobility Index. BBS, Berg Balance Scales

† Mann-Whitney U test of MW group vs. Control group

* p<.05

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