

P46

Effects of Newly Developed Trunk Stabilization Training Robot in patients with Chronic Stroke

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Objective

The objective of our study was to prove the therapeutic effects of used a newly developed trunk stabilization training robot (3DBT-33) on patients with chronic stroke.

Method

Thirty eight patients with chronic stroke were randomly assigned to an experimental or a control group. Both groups participated in conventional physical therapy for 30 mins a day, 5 days a week for 4 weeks. The robot group (n=19) received 30-min of trunk stability robot training in addition to conventional physical therapy. The control group (n=19) received the same amount of conventional physical therapy as the robot group. All participants were assessed by: : The Functional Ambulation Categories (FAC), Timed Up and Go test (TUG), the Berg Balance Scale (BBS), the Korean Modified Barthel Index (K-MBI) and the Fugl-Meyer Assessment of lower extremity (FMA-LE, the lower extremity part ranging from 0 to 36) before the intervention began (week 0) and after the intervention (week 4), as well as 4 weeks later after the intervention (week 8).

Results

In both groups, there were statistically significant improvements in all parameters (FMA-LE, K-MBI, FAC, BBS and TUG) at follow-up assessment after 4 weeks of intervention ($p < 0.05$). When the two group's training effects were compared, there were statistically significant differences in FMA-LE, K-MBI and BBS between the robot and control groups ($p < 0.05$). There was no significant difference in FAC ($p = 0.935$) and TUG ($p = 0.442$).

Conclusion

The findings in the present study showed that trunk stabilization rehabilitation training using a newly designed rehabilitation robot in patients with chronic stroke was effective to improve gait and the ability to perform ADL, where it was even more effective than conventional therapy in improving the ability to perform ADL.

	Robot group				Conventional Rehabilitation group				Inter-group p
	mean±SD(SD:standard deviation)			p	mean±SD(SD:standard deviation)			p	
	T0	T1	T2		T0	T1	T2		
FMA-LE (Score)	21.47±4.69	24.15±4.66	25.73±4.36	0.000 *	18.36±6.06	18.78±6.15	19.42±5.50	0.012 *	0.000 *
MBI (Score)	61.31±17.59	65.26±17.51	67.94±16.61	0.000 *	56.78±20.59	58.42±19.59	59.63±18.96	0.013 *	0.044 *
FAC (Score)	3.21±0.78	3.47±0.90	3.57±0.69	0.005 *	2.89±0.99	3.10±0.80	3.21±0.71	0.030 *	0.935
BBS (Score)	33.21±4.27	37.84±5.82	40.57±4.95	0.000 *	33.47±6.21	36.42±5.17	37.89±5.03	0.000 *	0.050 *
Time up & Go (Seconds)	38.16±29.69	30.77±21.85	26.47±19.15	0.001 *	55.04±37.80	49.91±30.32	35.72±18.76	0.028 *	0.442

Abbreviation : FMA-LE(Fugl-Meyer Assessment - Lower Extremity), MBI(Modified Barthel Index), FAC(Functional Ambulation Category), BBS(Berg Balance Scale), T0(Pre-Intervention), T1(Post-Intervention), T2(Follow-up after 4weeks at post-intervention), * (p<0.05)

Results before and after intervention and significance between groups