

Robot-assisted arm trainer in subacute stroke patients; pilot-study

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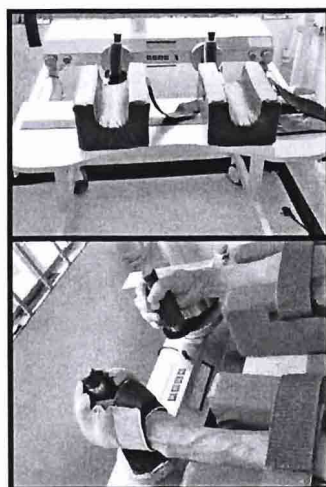
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Introduction :

Robot assisted trainer are develop to improvement correct movement pattern Bi-Manu Track is robot assisted arm trainer for improve forearm pronation-supination and wrist flexion-extension.

Objective :

The objective of this research were randomized-controlled trial to study whether a robot-assisted arm trainer [AT = Bi-Manu track], utilizing repetitive cycles of passive and active bilateral forearm and wrist movements, will improve motor and functional scores of the upper limb in moderately to severely affected subacute stroke patients at Prasat Neurological Institute.

Methods :

The subjects were twenty subacute [< 3 months after stroke] ischemic stroke patients with severe upper limb paresis: Fugl-Meyer Motor Score of upper extremities [FM UE ≤ 27]. Twenty patients were randomly assigned to either the occupational therapy program [OT] or OT with AT. All patients practiced for 30 min/day, 3-5 days/week, for at least 4 weeks. In addition, AT patients exercised 30 minutes per day with the robot. The primary measurement of progress was the motor score [FM UE 0-66], and the secondary measurements were functional scores [the Manual Function Test, MFT 0-32] and muscle tone [Modifies Ashworth Score, MAS 0-4].

Results :

Table 1 Demographic Data

Demographic Data/group	Experimental (N=9)	Control (N=11)
Age, mean (SD)	61.73 (7.63)	61.10 (19.51)
Gender		
Male	6 (30%)	7 (35%)
Female	3 (15%)	4 (20%)
Education level		
Primary	5 (25%)	8 (40%)
Secondary	3 (15%)	3 (15%)
University	1 (5%)	0 (0%)
Weakness		
Rt. hemiparesis	2 (10%)	7 (35%)
Lt. hemiparesis	7 (35%)	4 (20%)
Underlying diseases		
Hypertension	5 (25%)	8 (40%)
Diabetes mellitus	0 (0%)	4 (20%)
Hypercholesterolemia	6 (30%)	11 (55%)

Table 2 Mean (SD) of pre -test and post-test score of ability to movement by Fugl-Meyer Motor Score of upper extremities, spasticity by Modified Asthworth scale and functional ability by The Manual Function Test

Group	N	FM UE		MAS		MFT	
		Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
experimental	9	15.18 (6.55)	35.36(21.83)*	1.36(1.30)	1.91(1.94)	4.73(3.27)	16.27(14.73)*
control	11	10.22 (6.90)	28.11(14.77)*	1.22(3.04)	1.67(0.92)	2.22(3.26)	13.00(10.44)*

* Significant difference ($p < .05$)

Pre-test and post-test scores of The FM UE and MFT improved over 4 weeks in both OT and OT+AT groups are statistically significant difference, but MAS tone is no statistically significant difference.

Table 3 Mean (SD) of ability to movement by Fugl-Meyer Motor Score of upper extremities, spasticity by Modified Asthworth scale and functional ability by The Manual Function Test of experimental and control group

Group	N	FM UE	MAS	MFT
experimental	9	35.36(21.83)	1.91(1.94)	16.27(14.73)
control	11	28.11(14.77)	1.67(0.92)	13.00(10.44)

The experimental and control group are no statistically significant difference in FM UE, MAS and MFT.

Conclusions :

The results indicate that AT provides no additional benefits to conventional occupational therapy. However, alternate studies measuring different variables should be conducted to further assess the impact of AT.

Key Words: stroke, subacute, hemiparesis, robotics, upper limbs, motor function, activity function