高雄醫學大學 100 學年度研究所招生考試試卷　系所: 職能治療學系碩士班
科目:期刊剖析

請先詳細閱讀下列期刊，再回答所列出的問題

Journal Title: Randomized Trial of Distributed Constraint-Induced Therapy Versus Bilateral Arm Training for the Rehabilitation of Upper-Limb Motor Control and Function after Stroke (Neurorehabilitation and Neural Repair 25(2) 130–139)

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Approximately 30% to 66% of stroke survivors report persistent movement impairment of their upper extremity (UE) and are unable to use their affected arm in daily activities. Among a wide range of UE interventions, constraint-induced therapy (CIT) (including distributed CIT [dCIT]), and bilateral arm training (BAT) are 2 evidence-based treatments. Many natural daily activities, however, require bilateral movements. It remains uncertain whether a patient should exclusively use the affected UE for practice, in accord with the concept of CIT, to optimize the treatment outcomes. Rigorous comparisons of CIT with alternative interventions, including BAT, have been proposed to address this concern.

The specific purpose of this study was to compare the efficacy of dCIT, BAT, and control treatment (CT) on movement strategies of the affected UE and functional outcome in stroke patients. We hypothesized that dCIT and BAT, compared with CT, would render better performance on movement strategies in the affected UE during unilateral and bilateral testing tasks and also achieve greater motor and functional gains for stroke patients. In addition, dCIT and BAT may produce differential effects on movement strategies and functional outcome given the different treatment principles and neural mechanisms underlying the intervention approaches.

Methods

Participants

We recruited 66 stroke patients (mean age, 53.11 years; mean stroke onset, 16.20 months) from 4 stroke rehabilitation units.

Design

This study used a randomized pretest and posttest control group design. Eligible participants were randomized to dCIT, BAT, or CT treatment groups using the computerized (block) randomization scheme. The interventions were administered during regularly scheduled occupational therapy sessions. All other routine interdisciplinary stroke rehabilitation that did not involve UE training, including physical therapy or speech therapy, proceeded as usual. Five

certified occupational therapists were trained in the administration of dCIT, BAT, and CT protocols by the primary investigators to provide consistent intervention protocols. Before and after the 3-week intervention period, kinematic analysis and clinical outcome measures were administered by 2 certified, trained occupational therapists blinded to the participant group.

Outcome Measures

Kinematic analysis acquisition. Experimental tasks used in the kinematic analysis included a unilateral task that involved pressing a desk bell as fast as possible with the index finger of the affected hand and a bilateral task that involved pulling a drawer with the affected hand and retrieving an eyeglass case inside the drawer with the unaffected hand at a comfortable speed. Kinematic variables for reaching included normalized movement time (NMT), normalized movement unit (NMU), peak velocity (PV), and the percentage of movement time where peak velocity (PPV) occurred.

Functional assessments. The WMFT is a function-based motor assessment of 17 tasks, including 15 timed and functional ability tasks and 2 strength tasks. Performance time (WMFT-Time), functional ability scores (WMFT-FAS), and strength (WMFT-Strength) were reported. The Motor Activity Log (MAL) is a functional measure of a participant's perception of real-world use of the affected UE for 30 daily activities. The amount of use (AOU) and the quality of movement (QOM) of the affected arm were assessed.

Statistical Analysis

Multivariate analyses of covariance (MANCOVAs), which control for the probability of type I errors produced by repeated comparisons, were used to examine change in outcome measures as a function of treatment while controlling for pretreatment performance. We performed 4 separate MANCOVAs for the variables of unilateral reaching, bilateral reaching, WMFT, and MAL, adjusting for pretreatment performance. Follow-up univariate analysis of covariance (ANCOVA) for each dependent variable was used for relative means when the MANCOVA demonstrated a significant effect. To index the magnitude of group differences in performance, $\eta 2 = SSb/SStotal$ was calculated for each outcome variable. The value of $\eta 2$ is independent of sample size and represents the variability in the dependent variable (posttest performance) that can be explained by group.

Results

Kinematic Measures

MANCOVAs revealed a significant main effect for the group for unilateral and bilateral reaching kinematics (unilateral Downloaded from task: $F_{8,110} = 3.61$, $P = .001$, power = 0.97; bilateral task: $F_{6,112} = 5.74$, $P = .043$, power = 0.80). Table 1 reports the results of post hoc ANCOVAs for the kinematic variables. For the unilateral reaching task, a significant and moderate

to large effect on NMU and a large effect on PV, but not on NMT and PPV, were found. For the bilateral reaching task, significant and moderate to large effects on NMU and PV, but not on NMT and PPV, were obtained. Participants in the dCIT and BAT groups significantly improved in movement smoothness, whereas the CT group did not (unilateral: $P = .021$ for dCIT vs CT, $P = .032$ for BAT vs CT; bilateral: $P = .025$ for dCIT vs. CT, $P = .019$ for BAT vs. CT). No significant difference in NMU was found between the dCIT and BAT groups. Compared with the CT group, the BAT group showed significantly higher PV (unilateral, $P < .001$; bilateral, $P = .006$). No significant differences in PV were found between the dCIT and CT groups and between the dCIT and BAT groups.

Clinical Measures

MANCOVAs revealed a significant main effect for group for the WMFT ($F_{6,112} = 5.74$, $P = .043$, power = 0.77) and the MAL ($F_{4,120} = 5.74$, $P \leq .0001$, power = 0.97). Post hoc ANCOVAs showed significant and moderate to large effects on WMFT-Time, WMFT-FAS, and MAL-QOM and a significant and large effect on MAL-AOU but not on WMFT Strength. The dCIT group demonstrated significantly greater improvements in the WMFT-Time ($P = .044$) and WMFTFAS ($P = .020$) than the CT group. The dCIT group produced higher gains in the MAL-AOU ($P = .002$ for dCIT vs CT; $P = .010$ for dCIT vs BAT) and MAL-QOM ($P = .036$ for dCIT vs CT; $P = .005$ for dCIT vs BAT) than the CT and BAT groups. No significant difference between the CT and BAT groups was documented in any of the clinical measures.

Discussion

After intervention, the dCIT and BAT groups had smoother reaching trajectories in the unilateral and bilateral tasks than the CT group. The BAT group, but not the dCIT group, also generated greater force at movement initiation during the unilateral and bilateral tasks after the intervention than the CT group. Only the dCIT group showed greater ability to perform functional UE tasks measured by the WMFT than the CT group. The dCIT group also achieved better performance in the amount and quality of use of the affected limb, as measured by the MAL scale, than the BAT and CT groups.

Table 1 Descriptive and Inferential Statistics for the Kinematic Variables and Clinical Measures

Outcome Measures	Pretreatment			Posttreatment			Univariate F		
	dCIT	BAT	CT	dCIT	BAT	CT	F	P	η^2
Kinematic variable									
Unilateral task									
NMT,s/cm	0.06±0.03	0.06±0.06	0.04±0.02	0.04±0.02	0.04±0.02	0.04±0.02	1.12	.331	.036
NMU,unit/cm	0.21±0.12	0.19±0.23	0.12±0.07	0.12±0.09	0.11±0.12	0.14±0.10	3.47	.037*	.10
PV, cm/s	67.33±15.95	67.23±19.32	73.94±18.92	72.68±14.64	78.53±18.50	70.86±15.56	6.36	.003**	.17
PPV, %	29.83±9.48	35.94±14.63	35.34±13.36	37.40±14.59	36.26±13.48	35.11±12.74	6.00	.057	.089
Bilateral task									
NMT,s/cm	0.05±0.02	0.05±0.02	0.04±0.02	0.04±0.02	0.04±0.01	0.04±0.02	1.55	.22	.048
NMU,unit/cm	0.18±0.13	0.17±0.12	0.20±0.18	0.13±0.07	0.12±0.08	0.19±0.21	3.70	.03*	.11
PV, cm/s	62.29±14.91	59.22±11.47	87.78±99.11	66.88±14.26	69.72±11.84	92.31±99.26	4.26	.019*	.12
PPV, %	33.11±11.53	37.74±10.50	35.09±8.46	35.42±10.94	37.11±9.95	35.28±9.29	0.09	.91	.003
Clinical measures									
WMFT									
TIME	8.77±7.67	7.57±8.79	7.18±6.95	4.02±2.49	4.25±5.03	5.83±4.65	3.29	0.44*	.10
FAS	3.26±0.65	3.09±0.70	3.48±0.89	3.78±0.71	3.42±0.83	3.66±0.87	4.21	0.20*	.12
Strength	14.23±11.01	12.04±6.29	13.25±9.04	14.81±8.79	13.70±7.12	13.82±9.10	0.22	0.81	.01
MAL									
AOU	1.02±0.82	0.90±0.77	1.03±0.72	2.11±1.05	1.41±1.06	1.42±0.93	5.82	.005**	.16
QOM	1.06±0.83	1.02±0.76	1.20±0.88	2.30±1.01	1.52±1.09	1.87±1.26	4.51	.015*	.13

Abbreviations: SD, standard deviation; dCIT, distributed constraint-induced therapy; BAT, bilateral arm training; CT, control treatment; NMT, normalized movement time; NMU, normalized movement unit; PV, peak velocity; PPV, percentage of movement time to peak velocity; WMFT, Wolf Motor Function Test; Time, performance time; FAS, functional ability scores; Strength, grip strength and lift the maximum possible weight onto a box; MAL, Motor Activity Log; AOU, amount of use; QOM, quality of movement.

a*$P < .05$; **$P < .01$; the P values with an asterisk indicate significant differences among the treatment groups.

在看完上述期刊內文後 ，請回答下列問題:

1. 請摘要敘述本篇研究之：（1）背景（2）研究問題（3）研究方法程序（4）研究結果。（40%）
2. 本篇研究為randomized trial，請說明此種研究方式的特色及優點為何?（10%）
3. 請說明本篇研究所使用的統計方式、及該方式的應用時機？並說明η^2的意義。（10%）
4. 依作者在討論中(Discussion)的論述，請敘述本研究之臨床意義與應用?（20%）
5. 依您所見，本篇研究的主要限制為？及試著說明這些因素如何限制研究結果的應用。（20%）