Constraint-Induced Movement Therapy for Upper Extremities in Patients With Stroke

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Constraint-induced movement therapy (CIMT) is a current approach to stroke rehabilitation that implies the forced and prolonged use of the affected arm by restraining the unaffected arm by enhancing the recovery of the residual motor power.

The enhancement of the residual motor power by compulsory exercise is controversial.

Objective
The objective was to assess the efficacy of CIMT for arm management in hemiparetic patients.

Search Strategy
We searched the Cochrane Central Register of Controlled Trials (CENTRAL), the Cochrane Library (Issue 1, 2008), the Cochrane Stroke Group trials register, MEDLINE, EMBASE, CINAHL, and PEDro (all to June 2008).

Selection Criteria
We selected randomized trials comparing CIMT, modified CIMT, or forced use with other rehabilitative techniques or none in adults after stroke.

Data Collection and Analysis
Two review authors independently selected trials, assessed quality, and extracted data.

Main Results
Nineteen studies involving 619 participants were included in the review. Participants had some residual motor power of the paretic arm, limited pain, or spasticity but tended to use the limb little if at all. The intervention implied the forced use of the affected arm by restraining the unaffected upper extremity at both the hand and arm or only at the hand plus standardized or nonstandardized exercise with the paretic arm. Among studies, the time of restraint ranged from 2.7 to 9 hours per day and the total time of exercise from 3 to 45 hours per week for 2 to 10 weeks of treatment duration. Many of these mainly small studies demonstrated a range of methodological weaknesses.

Six of 19 trials (184 patients) assessed disability, our primary outcome, immediately after the intervention, indicating a significant moderate benefit, standard mean difference of 0.36, and 95% CI 0.06 to 0.65 (Figure). Two of these studies explored disability after 3 to 6 months of follow-up and found no significant difference between CIMT and usual care (standard mean difference −0.07, 95% CI −0.53 to 0.40).

Studies were heterogeneous in terms of patient case mix and CIMT implementation. We explored possible sources of heterogeneity in post hoc subgroup analyses for dosage of task practice, time since stroke, and anatomic region restraint. Marginally significant effects were obtained for the dosage of task practice suggesting better ability outcomes for exercise not exceeding 20 hours per week.

Authors’ Conclusions
CIMT led to a moderate reduction in disability assessed at the end of the treatment period. Whether benefit persists after 6 months it is not clear. The limited number and small sample size of the included randomized, controlled trials restricts the confidence that can be attributed to these results.

CIMT is a multifaceted intervention; the restriction to the normal limb is accompanied by a certain amount of exercise. However, we could not identify which of these 2 factors contributes most.

Implication for Practice
Patients who might benefit from this treatment are those with active hand/arm movement and limited spasticity who underuse or do not use it in daily living.
Implication for Research

Adequately powered randomized trials should focus on detecting the rationale of improvements after CIMT establishing which subgroup of patients is most likely to respond and which would be the correct dosage and the best constraint technique.


Disclosures

None.

Key Words: functional recovery ■ physiotherapy ■ stroke ■ upper extremity
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