

Case Study

Effects of task-oriented training on upper extremity function and performance of daily activities by chronic stroke patients

JuHYUNG PARK, MSc, OT¹⁾, CHANUK YOO, MSc, OT^{2)*}

¹⁾ Department of Occupational Therapy, Kyungbuk College, Republic of Korea

²⁾ Department of Occupational Therapy, Hanlyo University: 94-13 Hanlyo University Rd, Gwangyang-eup, Gwangyang-si, Jeollanam-do 545-704, Republic of Korea

Abstract. [Purpose] The aim of this study was to determine the effects that task-oriented training has on upper extremity function and performance of daily activities by chronic stroke patients. [Subjects and Methods] Task-oriented training was applied to two chronic hemiplegic patients in this research. The training was provided to each patient for 30 minutes a day, five times a week for two weeks. The treatment program included six different types of training that could be performed by the patients themselves. Evaluation was performed four times, that is, once a week for three weeks before the intervention and once after the intervention. The change in upper extremity function was measured with the Manual Function Test, and the change in performance of daily activity was measured with the Functional Independence Measure. [Results] The upper extremity function of both subjects was improved after application of task-oriented training. However, in the performance of daily activities, subject one showed improvement compared to with before the intervention, whereas subject two showed the same results. [Conclusion] This research confirmed that two weeks of task-oriented training for chronic stroke patients is effective for improvement of upper extremity function and performance of daily activities by chronic stroke patients.

Key words: Task-oriented training, Upper function, Stroke

(This article was submitted Apr. 13, 2015, and was accepted May 6, 2015)

INTRODUCTION

Motor and cognitive-perceptual disability could occur in patients who have suffered brain damage from a stroke, which could undermine their capacity to perform daily activities¹⁾. Carr and Shepherd suggested task-oriented training as a treatment method to help improve deteriorated motor skills of stroke patients and their capacity to perform daily activities, and diverse functional activities properly applied to patients can help improve their actual motor skills and capacity to perform daily activities²⁾. Task-oriented training refers to programs that focus on special functional tasks that unite the muscular skeletal system and nervous system³⁾ and treatments that encourage active participation and focus on functional tasks rather than simple, repetitive training of normal motion patterns⁴⁾. Research on task-oriented training has been active lately, but application of new research results in the clinical environment is impractical because most patients are hospitalized for short periods and programs often have long application periods, which are usually longer than three

weeks⁵⁾. Thus, the aim of this research was to determine the treatment effect of a short period of task-oriented training (two weeks) on upper extremity function and performance of daily activities in chronic stroke patients.

SUBJECTS AND METHODS

The subjects of this research were two patients diagnosed with hemiparalysis from stroke and hospitalized in K Korean hospital. The general characteristics of the subjects are noted in Table 1. Subject one was a 38-year-old male who was diagnosed with middle cerebral artery infarction and left hemiparalysis and had been hospitalized for 24 months. Subject two was a 54-year-old male who was diagnosed with middle cerebral artery infarction and left hemiparalysis and had been hospitalized for 29 months. Subjects one and two were both naturally right-handed before their strokes and receiving conservative physical therapy and work treatment for 30 minutes a day, five times a week. The patients volunteered to participate and understood the objectives and contents of this study, and both showed a willingness to actively participate in the study. The patients and their guardians signed an informed consent form after receiving information about the purpose and methods of the study. Also, the study was approved by the Inje University Faculty of Health Science Human Ethics Committee. The inclusion criteria for the research subjects were as follows: diagnosis of cerebral infarction, reasonable communication skills and

*Corresponding author. Chanuk Yoo (E-mail: share5184@nate.com)

Table 1. General characteristics of the subjects

	Age	Gender	Diagnosis	Affected side	Dominant hand	Months from stroke onset	MMSE-k
Participant 1	38	Male	Ischemic	Lt.	Rt.	24	38
Participant 2	54	Male	Ischemic	Lt.	Rt.	36	54

24 points or more on the mini-mental status examination for Koreans (MMSE-K), no hemineglect phenomenon, and a Brunnstrom recovery stage of four or higher. This study used an interrupted time series (ITS) design to determine whether task-oriented activity had an effect greater than that of natural recovery on impairment of the hemiplegic arm and hand of the subjects after a stroke. ITS designs are characterized by the collection of multiple observations over time that are “interrupted” by an intervention or treatment⁶. Evaluation was performed four times, that is, once a week for three weeks before the intervention and once after the intervention. Easily accessible and most-often-used tools in the clinical environment were chosen as evaluation tools. The Functional Independence Measure (FIM) was used for assessment of subjects’ capacity to perform daily activities, and the Manual Function Test (MFT) was used for assessment of the level of upper limb function. The FIM is a tool for assessing the capacity of disabled patients to perform daily activities objectively; it is widely used and has a reliability level of 0.83–0.96 among inspectors⁷. The MFT is a tool for assessing the functional level of upper limbs in the area of daily activity performance and the recovery process. Its reliability level among inspectors and by repeated evaluation is indicated by a Cronbach’s alpha coefficient of 0.95 or higher, and its inner consistency validity is 0.95 or higher⁸. Task-oriented training was provided to each patient for 30 minutes a day, five times a week for two weeks. The task-oriented training provided to the patients included six different types of training that could be performed by the patients themselves. The activities were as follows: changing hospital gowns, throwing a tennis ball into a basket, stacking cones, moving pegs, wiping tables with a towel, and passing rings along curved rods. Data analysis included descriptive analysis of mean differences to test whether the task-oriented training had a larger positive effect on impairment than natural recovery. For each participant, individual pre-intervention data points were used to determine the mean pre-intervention score for each measure; the same procedure was followed to obtain mean post-intervention scores.

RESULTS

Table 2 shows the upper extremity function and ADL scores before and after the task-oriented training. The before, after, and mean difference scores for all measures are presented in Table 2. Improvements were shown for most items of the subjects, and only the FIM in subject two showed no difference between the pre-intervention and post-intervention scores.

Table 2. Mean pre- and post-intervention scores and mean differences

Measure	Pre-intervention mean	Post-intervention mean	Mean difference
MFT			
Participant 1	18.0	20.0	2.0
Participant 2	22.2	24.0	1.8
FIM			
Participant 1	121.0	122.0	1.0
Participant 2	124.0	124.0	0.0

MFT: Manual Function Test; FIM: Functional Independence Measure

DISCUSSION

The primary purpose of this study was to evaluate whether task-oriented training has a positive effect on upper extremity function and ADL compared with natural recovery of people in the chronic phase after a stroke. The results of this study confirmed the positive effect of task-oriented training on all items except the FIM results of subject two. The subjects in this research participated in the task-oriented training for thirty minutes a day, five times a week for two weeks, which is a relatively short application period compared with most previous studies, which have applied long task-oriented training periods of three weeks or more⁵. However, this research method is more suitable for a clinical environment with short periods of hospitalization. Nevertheless, consistent with the results of previous studies of task-oriented training, the present study also observed a positive effect on the affected side upper extremity. This indicates the possibility that even a short period of task-oriented training can produce positive treatment effects. Also, task-oriented training had a positive effect on the affected upper extremity even though the subjects in this research were chronic stroke patients. This corresponds with the results of Kim’s research, in which electrical stimulation of the dermatomes combined with task-oriented movements was applied to chronic stroke patients and resulted in improvement of hand functions⁹. However, there was no improvement in subject two’s capacity for daily activity after the intervention in the present study. Possible explanations for this include the fact that subject two was older than subject one and the possibility that subject two’s capacity to perform daily activities was already high. The clinical significance of this research is the introduction of a more easily applicable form of task-oriented training for chronic stroke patients in a clinical environment compared with many other previous studies that also employed task-oriented training and confirmation

of the possibility that it is an effective treatment. However, there are some limitations to this research: generalizing the results of this research is difficult due to the small number of subjects, and since the two subjects were not treated simultaneously, the possible influence of external treatment variables cannot be excluded.

REFERENCES

- 1) Kim JM, Stewart R, Shin IS, et al.: Vascular disease/risk and late-life depression in a Korean community population. *Br J Psychiatry*, 2004, 185: 102–107. [[Medline](#)] [[CrossRef](#)]
- 2) Carr JH, Shepherd RB: *Stroke rehabilitation*. London: Butterworth-Helenemann, 2003.
- 3) Yang YR, Wang RY, Lin KH, et al.: Task-oriented progressive resistance strength training improves muscle strength and functional performance in individuals with stroke. *Clin Rehabil*, 2006, 20: 860–870. [[Medline](#)]
- 4) French B, Leathley M, Sutton C, et al.: A systematic review of repetitive functional task practice with modelling of resource use, costs and effectiveness. *Health Technol Assess*, 2008, 12: iii, ix–x, 1–117. [[Medline](#)] [[CrossRef](#)]
- 5) Rensink M, Schuurmans M, Lindeman E, et al.: Task-oriented training in rehabilitation after stroke: systematic review. *J Adv Nurs*, 2009, 65: 737–754. [[Medline](#)] [[CrossRef](#)]
- 6) Ramsay CR, Matowe L, Grilli R, et al.: Interrupted time series designs in health technology assessment: lessons from two systematic reviews of behavior change strategies. *Int J Technol Assess Health Care*, 2003, 19: 613–623. [[Medline](#)] [[CrossRef](#)]
- 7) Granger CV, Hamilton BB, Linacre JM, et al.: Performance profiles of the functional independence measure. *Am J Phys Med Rehabil*, 1993, 72: 84–89. [[Medline](#)] [[CrossRef](#)]
- 8) Miyamoto S, Kondo T, Suzukamo Y, et al.: Reliability and validity of the Manual Function Test in patients with stroke. *Am J Phys Med Rehabil*, 2009, 88: 247–255. [[Medline](#)] [[CrossRef](#)]
- 9) Kim Y, Yi CH, Lee YH, et al.: Immediate effects of dermatomal electrical stimulation on task-oriented movements in patients with chronic hemiplegia. *J Phys Ther Sci*, 2013, 25: 89–91. [[CrossRef](#)]