

Effects of Communal Task-Oriented Circuit Training on Depression and Self-Efficacy for Chronic Stroke Patients

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Abstract

The purpose of this study was to invest the effect of communal task-oriented circuit training on depression and self-efficacy for chronic stroke patients. Thirty subjects were randomly divided into the Communal Task-oriented Circuit training Group (CTCG, n = 15) and Individual Task-oriented Circuit training Group (ITCG, n = 15). All subjects were evaluated by depression scale (CES-D) and Self-Efficacy Scales (SES) before and after the task-oriented circuit training. All patients performed 60 minutes training a day, thrice a week for 6 weeks. After 6 weeks intervention, CTCG showed the significant decreased in CES-D ($p < .01$) and SES ($p < .05$). Especially, CES-D showed significant difference between two groups. However, ITCG showed no significant difference in CES-D and SES. These findings indicate that communal task-oriented circuit training can be effective on depression and self-efficacy for chronic stroke patients.

Keywords: Communal Task-Oriented Circuit Training, Depression, Self-Efficacy, Stroke

1. Introduction

Stroke is a form of external non-traumatic brain damage accompanied by neurological defects due to brain vessel discoloration and damage¹. Depending on the location and cause of the brain damage, various types of motor, sensory, perception, cognitive, and language disabilities occur and the main symptom is unilateral paralysis^{1,2}. Such disabilities lower motor ability, thus reducing gait and physical activity. Moreover, stroke patients experience psychological problems when they lose their role in local communities, including depression and loss of self-efficacy¹¹.

Almost 50% of stroke experienced people may suffer psychological or emotional disorder from it. Between 35%, and 50% of them have got depression of stroke¹. Depression is one of outcomes from cognitive and

neurological damage². Stroke patients with depression have lower self-efficacy than those without depression and their quality of life is also low¹⁰.

Furthermore, depression affects a negative influence on quality of life for both patients and their family as a care-giver after the outbreak¹. Such psychological problems interfere with recovery, further exacerbating the disease. Therefore, the treatment of stroke patients must address both physical and psychological problems⁹.

The purpose of stroke rehabilitation is to help patients back to independent daily living through improving the physical function and exercise intervention is a commonly used rehabilitation method⁴. Among them, the circuit task-oriented training, which has been recently developed and one of therapy approach to enhance physical function for stroke patients⁶. This training includes an extensive range of interventions such as walking and treadmill training,

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endurance training, sit-to-stand training, and reaching and standing up for improving functional balance^{6,8}. It helps their quality of life, thereby reducing depression and anxiety and improving self-efficacy³. Especially communal circuit task-oriented training showed more effective results on functional recovery than individual one because the social interaction between patients in the group encouraged participants and made them having positive mind and motivation⁵.

Therefore the purpose of this study was to prove the effect of a communal task-oriented training in comparison with individual training on mental health for chronic stroke patients with depression and self efficacy.

2. Materials and Methods

2.1 Subjects

In this study, thirty participants diagnosed with chronic stroke patients with depression by the department of neurosurgery of G rehabilitation hospital in South Korea were participated. The participants were randomly divided into two groups, Communal Task-oriented Circuit training Group (CTCG, n = 15) and Individual Task-oriented Circuit training Group (ITCG, n = 15). 3 patients in CTCG and 4 patients of ITCG were dropped out and finally 23 patients were involved this study. Before administrating interventions of this study, the subjects were given the procedures and the purpose of this study, and gave written informed consent.

Eligibility criteria included

- 6 month past stroke patients.
- Ability to walk 10 m independently, don't using an aid or orthotic, without supervision.
- 14 points and over of Korea form Geriatric Depression Scale (KGDS).
- No surgical lesion related gait.
- No visual and vestibular lesion related balancing.
- No musculoskeletal and cardio respiratory dysfunction.
- Ability to comprehend the instructions for the test procedure.

Table 1. Physical characteristics

	Gender	Age(yrs.)	Side of Hemiparesis	Duration of disease(month)	MMSE-K(score)	KGDS(score)
CTCG (n=15)	M:8 F:7	50.93±9.26	Right : 7 Left : 8	20.67 ± 8.43	26.93 ± 2.35	18.67 ± 3.99
ITCG (n=15)	M:10 F:5	54.53±7.05	Right : 7 Left : 8	21.60 ± 9.96	25.60 ± 3.18	18.33 ± 3.90

Communal Task-oriented Circuit training Group (CTCG), Individual Task-oriented Circuit training Group (ITCG). Mini-Mental State Examination-Korean (MMSE-K), Korea form of Geriatric Depression Scale (KGDS)

- Ability to provide informed consent.

The physical characteristics of the subjects are shown in Table 1.

2.2 Study Design

Subjects were randomly divided into CTCG and ITCG in order to evaluate depression scale and Self efficacy Scale before and after the 6-week exercise program.

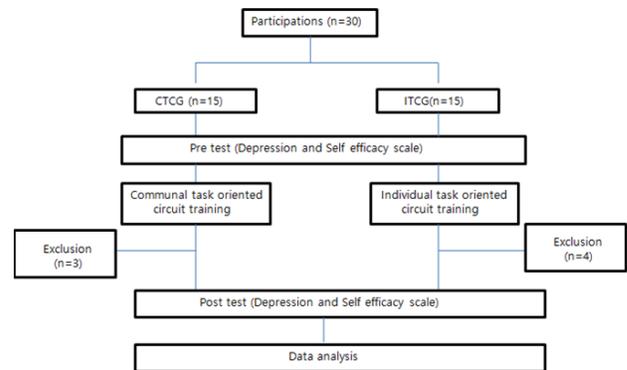


Figure 1. The screening process.

2.3 Materials and Methods

2.3.1 Center for Epidemiological Studies-Depression Scale (CES-D)

Depression was measured by the Center for Epidemiological Studies-Depression Scale (CES-D). The scale consists of 2 categories; 4 positive questions and 16 negative questions. Each question ranges from 0 to 3, namely has 4 point scale. The higher score means the higher severity of depression.

2.3.2 Self Efficacy Scale (SES)

Self-efficacy was measured by the Korean Self Efficacy Scale (K-SES), a modified Korean version of the SES. The scale consists of 2 categories; 17 questions of accomplishments self-efficacy and 6 questions of social self-efficacy. Accomplishments self-efficacy related 17

questions were not used and only social self-efficacy related questions were used for this study. Each question ranges from 1 to 5, namely has 5 point scale. The higher score means higher level of self-efficacy.

2.4 Exercise Intervention

This Task-oriented Circuit Training Program was based on the study of Salbach et al. to improve strength of lower, balance, speed and endurance and consists of 8 kinds of task-oriented training; Leg lift, Kicking toward wall, Sitting, standing and walking, Crossing of Obstacles, Walking with the maximum speed, Walking a treadmill To sit on the Swiss ball and Video game. It allows the practice of repetitive and rhythmic stepping.

The participants were randomly divided into two groups, Communal Task-oriented Circuit training Group

and Individual Task-oriented Circuit training Group. The training of both groups are thoroughly and identically supervised by PT on a one-for-one basis and performed in a same circumstance. All subjects were received 60 minutes a day, 3 times a week and 6 weeks long training.

3. Data Analysis

With all data obtained from this study, we calculated Mean (M) and Standard Deviation (SD) using SPSS/PC 18.0 statistic program for Windows. The paired t test was used for comparison of the pretest and posttest results of depression and self efficacy within each group, and the independent t test was performed for comparison of the two groups before and after exercise. Statistical significance was adopted at $P < 0.05$ in this study.

Table 2. Task-oriented Circuit training program

	Exercise type (time)	Contents	Target assignment	Intensity
Warming up	10min	Ankle dorsiflexion, plantar flexion Shoulder flexion, elevation, circumduction	Joint movement and muscle stretching improvement	RPE 8~9
Exercise	Leg lift (5min)	7cm, 15cm, 20cm lift foot on foothold Up and down Foothold	Improvement of Dynamic balance	RPE 10~15
	Kicking toward wall, (5min)	Kicking toward a wall by unaffected leg at 1m, 1.5m, 2m	Improvement of Dynamic balance	
	Sitting, standing and walking (5min)	Use the chair armrest Sit-to-stand from various chair heights to strengthen the affected leg extensor muscles	Improvement of Dynamic balance, gait and lower strength	
	Crossing of Obstacles, (5min)	Walking over various surfaces and obstacles	Improvement of Dynamic balance and gait	
	Walking with the maximum speed, (5min)	0.8km/h~4km/h	Improvement of Gait endurance	
	Walking a treadmill, (10min)	Promoting progressive speed (0.8km/h~4km/h)	Improvement of Gait endurance	
	To sit on the swiss ball, (5min)	To sit on swiss ball To pelvic tilt on swiss ball To reciprocal leg flexion and extension on swiss ball To reciprocal trunk flexion and extension on swiss ball	Improvement of Dynamic balance and lower strength	
	Video game (5min)	Team play of 2 people	Improvement of Coordination and dynamic balance	
Cool-down	10min	Deep breathing in sitting position, resting	Relaxation	RPE 8~9

4. Results

4.1 Changes to Depression Variable after the 6 Week

CTCG showed the significant decreased in CED-D of depression variable ($p < .01$). However ITCG showed no significant difference in CED-D of depression variable. Between two groups, there was significant difference in CED-D of depression variable ($p < .05$).

Table 3. Change of depression variable

Group	Pre - test	Post-test	t	p
CTCG	24.50 ± 9.98	16.83 ± 7.51	4.434	0.001**
ITCG	25.73 ± 8.83	23.64 ± 7.83	1.195	0.260

Communal Task-oriented Circuit training Group (CTCG), Individual Task-oriented Circuit training Group (ITCG), * $P < 0.5$ ** $P < 0.01$, *** $P < 0.001$

Table 4. The difference of depression variable among groups

Group	M±SD	t	p
CTCG	-7.67 ± 5.99	-2.263	0.034*
ITCG	-2.09 ± 5.80		

Communal Task-oriented Circuit training Group (CTCG), Individual Task-oriented Circuit training Group (ITCG), * $P < 0.5$ ** $P < 0.01$, *** $P < 0.001$

4.2 The Change of Self-Efficacy Variable after the 6 Week

CTCG showed the significant decreased in SES of self-efficacy variable ($p < .05$). However ITCG showed no significant difference in SES of self-efficacy variable. Between two groups, there was no significant difference in SES of self-efficacy variable.

Table 5. Change of self-efficacy variable

Group	Pre -test	Post-test	t	p
CTCG	32.00 ± 5.70	35.67 ± 5.91	-2.762	0.018*
ITCG	29.09 ± 4.74	31.36 ± 4.48	-1.999	0.074

Communal Task-oriented Circuit training Group (CTCG), Individual Task-oriented Circuit training Group (ITCG), * $P < 0.5$ ** $P < .01$, *** $P < .001$

Table 5. The difference of self-efficacy variable among groups

Group	M±SD	t	p
CTCG	3.67 ± 4.60	0.790	0.438
ITCG	2.27 ± 3.77		

Communal Task-oriented Circuit training Group (CTCG), Individual Task-oriented Circuit training Group (ITCG), * $P < 0.5$ ** $P < .01$, *** $P < .001$.

5. Discussion

Stroke patients is a chronic disease having various psychological disorders including depression as well as physical problem^{4,12}. The stroke patients with depression have lower physical function, cognition and self-efficacy than the patients without depression. Furthermore, it is harder for the former to approach rehabilitation than the latter⁶.

Therefore it is important to make them participate exercise program voluntarily and persistently by arousing their interest and motivating them. In this situation, recent studies have reported the effectiveness of communal exercise. In¹³ reported that the stroke patients trained in a group showed physically and psychologically effective results but the individually trained patients showed physically enhanced results only. In⁹ also reported that patients of chronic stroke with depression showed enhanced mental health after group progressive strength training.

Also, recent studies have insisted that communal task-oriented circuit training motivated stroke patients to participate the training thereby improving physical function and psychological recovery. Communal task-oriented circuit training cause social facilitation by means of co-action. It may bring more patients in and improve correctness of exercise. Furthermore, it may affect positive influence on self-efficacy and depression³. Nevertheless there is no precedence study to compare the effect for stroke patients between communal task-oriented circuit training and individual task-oriented circuit training on psychological disorders^{6,13}.

The purpose of this study was to compare the effect of communal task-oriented circuit training to an individual one on depression and self-efficacy for chronic stroke patients. The communal exercise may lead maximum results by means of interdependency, psychological ties, communication and competitive spirit between peers.

The results of this study, CTCG showed more effective results on depression and self-efficacy after task-oriented circuit training than ITCG. In detail, depression variable was significantly decreased in the CTCG ($p < .01$). However ITCG showed no significant difference in depression variable. Between two groups, there was significant difference in depression variable ($p < .05$). CTCG showed the significant decreased in SES of self-efficacy variable ($p < .05$). However ITCG showed no significant difference in SES of self-efficacy variable. Between two groups, there

was no significant difference SES of self-efficacy variable.

In⁷ insisted that a task-oriented circuit training reduced depress and recovery self-efficacy as well as improving physical ability. Also, in³ reported that communal task-oriented circuit training improved physical recovery significantly and made them active involvement in treatment and thus, brought psychosocial benefits like self-efficacy. This is because in the case of CTCG, group exercise contributes more greatly to emotional stability, with smooth interaction and increased motivation while exercising with others. On the other hand, ITCT had the same program in the same environment, but ITCT included a one-on-one relationship between the clinician and the patient. Therefore, CTCG was less effective than ITCG in reducing depression and increasing self-efficacy.

In conclusion, communal task-oriented circuit training for chronic stroke patients is an effective rehabilitation approach to improve psychological aspects as well as physical ability.

Further research on exercise intervention for stroke patients should consider psychosocial factors, such as, self-care and quality of life, because they are largely related to the recovery process after stroke and pay attention to developing communal exercise program, which can help patients build social relationships.

6. Acknowledgement

This study was supported by the Research Program funded by the Korea University.

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