

The effect of class-based task-oriented circuit training on the self-satisfaction of patients with chronic stroke

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Abstract. [Purpose] This study aimed to determine the difference in self-satisfaction in patients by comparing class-based task-oriented circuit training (CTCT) and individual-based task-oriented circuit training (ITCT). [Subjects and Methods] The subjects were 30 patients who had been diagnosed with hemiplegia due to stroke more than six months previously. They were divided into Group I (n=9) for conventional therapy, Group II (n=10) for conventional therapy and ITCT, and Group III (n=11) for conventional therapy and CTCT. In order to determine self-satisfaction as a psychological factor in patients, we used a self-esteem scale (SES), motivation of rehabilitation scale (MR), and relationship change (RCS) scale. [Results] SES, MR, and RCS, which were measured to determine self-satisfaction as a psychological factor were significantly different between groups. The Bonferroni post hoc test revealed a significant difference between Group I and Group III in SES, a significant difference between Group I and Group III and Group II and Group III in MR, and a significant difference between Group I and Group III were found. [Conclusion] Based on the above results, task-oriented circuit training was more effective when performed in a class than when performed individually in terms of self-satisfaction. Based on this result, we determined that CTCT has as positive an effect on the mental aspects of stroke patients compared with ITCT.

Key words: Self-satisfaction, Stroke, Task-oriented circuit training

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INTRODUCTION

Half of stroke patients experience hemiplegia, which limits independent life and social participation¹⁾. As a rehabilitation processes, many complicated and unique methods can be adopted, physically, socially, and mentally²⁾. In the biomedical field, rehabilitation refers to the recovery of damaged individual functional abilities³⁾, and task-oriented training may be used as a physical method to improve lost gait ability after stroke. Rensink et al.⁴⁾ reported that functional motion can improve the life quality-related health of stroke patients.

In addition, Thaut et al.⁵⁾ showed that emotional disorder in stroke patients was caused by physical disabilities and limitations in daily living, thereby emphasizing a treatment procedure that included not only physical function recovery but also addressed emotional issues during the rehabilitation period. The World Health Organization⁶⁾ announced a core model of 12 major chronic diseases for the International Classification of Functioning (ICF), Disability and

Health which is a method to record and classify functional disabilities and health-related information for disabled persons. Geyh et al.⁷⁾ summarized previous studies to develop a comprehensive ICF core set for stroke patients. He suggested that temperament, personality, and energy dynamics in the physical function category were a mental function subcategory and a component of the interpersonal relationships in the activity/participation category. This indicated that functional disorder due to the sudden onset of stroke represents a major area of adjustment in terms of social function and psychological factors⁸⁾. Therefore, not only physical aspects but also psychological and social aspects should be considered to improve the recovery of stroke patients. Class-based training can enhance motivation, encouragement, health awareness, and skill related to communication with others⁹⁾.

However, few studies have been done on changes in psychology (self-esteem, motivation of rehabilitation, and relationship change), which has in advantage of class training. In addition, although a number of studies have reported the positive effect of the task-oriented circuit training (TOCT) and class-based task-oriented circuit class training on functional movements, no studies have been done that have shown effective clinical application of TOCT.

Therefore, this study aimed to determine whether there is a difference in self-satisfaction when TOCT is applied through class- and individual-based programs.

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SUBJECTS AND METHODS

The subjects in this study were selected from patients who were diagnosed with stroke more than six months previously, had a score of 24 points or more on the Korean version of the mini-mental status examination, had no prior orthopedic diseases, could walk more than 10 meter without assistance, and could grasp an object on the floor in a standing position. This study was approved by the hospital it was performed in, and all the participants provided written informed consent.

Group I had five males and four females, Group II had eight males and two females, and Group III had nine males and two females. The general characteristics of Group I, Group II, and Group III were as follows. Their average ages were 53.78±9.97 years, 58.70±8.61 years, and 55.82±6.29 years. Their average heights were 162.00±7.86 cm, 168.40±6.48 cm, and 165.18±6.00 cm. Their average weights were 60.44±9.32 kg, 69.10±8.69 kg, and 70.00±5.13 kg, respectively. Group I, II, and III had two, seven, and eight subjects with paralyzed right sides and seven, three subjects with paralyzed left sides, respectively. Paralysis in Group I was due to cerebral hemorrhages in three cases and cerebral infarctions in six cases. Paralysis in Group II was due to cerebral hemorrhages in five cases and cerebral infarctions in five cases. Paralysis in Group III was due to cerebral hemorrhages in three cases and cerebral infarctions in eight cases.

This study aimed to determine the difference in gait ability and self-satisfaction resulting from CTCT. To achieve this goal, 42 subjects were divided into three groups to conduct the study experiment. Twelve patients were excluded due to health problems, so subjects were randomly assigned to Group I (n=9) as a conventional therapy group, Group II (n=10) as a ITCT group, and Group III (n=11) as a CTCT group. Groups II and III participated in TOCT 30 minutes per day, three times a week for four weeks.

The TOCT that was proposed by Salbach et al.¹⁰⁾ and Kim et al.¹¹⁾ was modified into a circular mode. The training tasks were sitting in a chair and walking, walking over the obstacles, carrying goods, turning the goods upside down, and walking fast in a circle. Group III (CTCT) was divided into two teams to conduct the tasks, while Group II (ITCT) conducted the same tasks as Group III individually.

The tools used in TOCT included four 55-cm-high chairs with armrests, a 13 × 13 cm square card with different colors on either side, a standardized 11-cm-high footrest, 130 × 200 cm green mats, and 20-cm-high bowling pins.

To measure the self-satisfaction of subjects, the self-esteem scale (SES), motivation of rehabilitation (MR), and relationship change (RCS) scale were used. To measure self-esteem, the SES developed by Rosenberg in 1965 was used¹²⁾. The confidence level of the measurement tool was $\alpha=0.85$. In order to evaluate the psychological change in the subjects participating in the rehabilitation, the MR developed by Garrett¹³⁾ was employed. The confidence level of the measurement tool was $\alpha=0.86$. To determine relationship changes, the RCS modified by Burnett¹⁴⁾ was used. The confidence level of the measurement tool was $\alpha=0.88$.

The statistical analysis in this study was done using SPSS 18.0 for Windows[®]. The general characteristics of the subjects were analyzed by descriptive statistics. To determine the difference in self-satisfaction (SES, MR, and RCS) between groups, the data were analyzed using ANCOVA while the Turkey method was used for the posttest. The statistical significance level was set to $\alpha=0.05$.

RESULTS

To determine the difference in the SES scale between groups, ANCOVA was conducted, and the results showed a statistically significant difference. The Bonferroni post hoc test revealed, a significant difference between Groups I and III ($p=0.019$), while no significant difference was found between Groups I and II or Groups II and III.

To determine the difference in motivation for rehabilitation between the groups, ANCOVA was conducted, and the results showed a significant difference. The Bonferroni post hoc test revealed, a significant difference was found between Groups I and III ($p=0.008$), and a significant difference between Groups II and III. No significant difference was found between Groups I and II.

To determine the difference in relationship changes between groups, ANCOVA was conducted, and the results showed a significant difference statistically. The Bonferroni post hoc test revealed, a significant difference between Groups I and III ($p=0.044$), while no significant difference was found between Groups I and II and Groups II and III (Table 1).

Table 1. Variation of self-satisfaction after task-oriented training

	Group I		Group II		Group III	
	Pre	Post	Pre	Post	Pre	Post
SES	28.9±3.8 ^a	27.0±4.7*	27.2±3.8	30.3±4.1	29.6±5.7	32.8±4.8 ^{††}
MR	82.9±12.3	83.7±6.1**	83.8±9.4	86.7±10.0	82.3±3.8	95.8±6.4 ^{††}
RCS	87.9±13.6	86.9±16.0*	83.8±10.7	90.2±0.1 [†]	92.8±12.3	100.3±11.6 ^{†††}

^aMeans (SD).

Group I, GT (conventional therapy), Group II, GT + ITCT; Group III, GT + CTCT, SES, Self-esteem scale; MR, motivation for rehabilitation scale; RCS, relationship change scale. Significance was tested by ANCOVA.

*Between-group comparison ($p<0.05$); **between-group comparison ($p<0.01$)

Significance for multiple comparisons was tested with the Bonferroni multiple comparison test.

[†] I vs. II ($p<0.05$); ^{††} I vs. III ($p<0.05$); ^{†††} II vs. III ($p<0.05$)

DISCUSSION

This study aimed to determine and compare the effects on self-satisfaction from a psychological viewpoint between individual and class TOCT applications, which were based on the motor learning theory.

The training tasks were sitting at a chair and walking, walking over obstacles, carrying goods, turning goods on the floor upside down, and walking fast in a circle. Group III, which participated in CTCT, consisted of four to six people who were divided into two teams. Group II participated in TOCT and individually performed the same tasks as Group III. In order to determine the effect of TOCT, Group I, which received conventional therapy, was assigned as a control group.

There was an improvement in physical functions as well as improvements in psychological aspects. Improvements in psychological aspects are considered to enhance the effect of therapy in stroke patients. Therefore, the need to develop programs that take into consideration patients psychology, such as motivation, was emphasized¹⁵⁾. A therapy method focusing on positive psychological change was conducted on a group rather than individual basis. Nayak et al.¹⁶⁾ used group music therapy to provide a positive opportunity for social interaction in patients with stroke and acute traumatic brain injury. This improved the motivation of participants to engage in social interaction and exercise, and significant changes in patient psychology were reported in their music therapy group, although no significant difference was found between groups.

The present study provided class-based training combined with TOCT, which can positively affect psychological changes in stroke patients, to determine the effect of the training on self-esteem, motivation of rehabilitation, and relationships. These factors can in turn affect the psychology of patients during the rehabilitation process. As a result, Group I and Group III showed a significant difference in the SES ($p < 0.05$), while Group I and Group III show a significant change in the RCS ($p < 0.05$). The present study aimed to determine how stroke patients who lived with various functional difficulties thought about themselves. The groups participating in TOCT showed greater improvement of self-esteem and self-acceptance as well as interpersonal relationships than the group that received conventional therapy. Such results are consistent with previous studies in which class-based training had a positive effect on the psychology of patients. This positive effect was obtained because patients with similar difficulties attempted to solve the same task together. Regarding the change in motivation for rehabilitation, a significant difference was revealed between Group I and Group III ($p < 0.01$) and between Group

II and Group III ($p < 0.05$). These results are also consistent with previous studies, and they were thought to be due to an increase in motivation for participation in rehabilitation resulting from encouragement and competition with others to solve difficulties in group TOCT, which does not occur in the case of performing TOCT individually.

This study found a more positive effect on patient psychology when TOCT was applied to patients as a group rather than as individuals. CTCT had a positive effect on the psychology of the stroke patients; therefore, CTCT can be effective for training programs that aim to change psychological factors in clinical practice.

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