

The Effect of a Community-Based Group Exercise in Chronic Stroke

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Abstract

Community-based group exercise programs for people with chronic stroke are relatively uncommon in Korea. In addition, it is currently not known whether a community-based group exercise program is effective or not. The purpose of this study was to evaluate an 8 week community-based functional exercise program for its effects on balance performance and occupational performance in persons with chronic stroke. Twenty-five community-dwelling individuals with stroke participated in this program. Outcome of the program was assessed by the Berg Balance Scale and the Canadian Occupational Performance Measure (COPM). The functional exercise program lasted for eight weeks, with a 1-hour program twice per week and it consisted of mobility, stability, balance, functional strength, and gait training. The subjects were trained by one physical therapist but were under one-to-one supervision from students. The data of sixteen individuals who scored more than 24 on the Mini-Mental State Examination (MMSE) were analyzed. There was a significant effect both in terms of the COPM Performance Score & the Satisfaction Score ($p=.002$) and with the Berg Balance Score ($p=.001$). It was found that a short-term community-based exercise program could improve both performance of activities and balance. Further, all subjects reported that they were satisfied with this program.

Key Words: Chronic stroke; Community-based group exercise program; Functional exercise.

Introduction

Improved survival rates of stroke victims and the growing elderly population have increased the prevalence of stroke. Despite intensive therapy during the first 6 months after stroke, a large proportion of stroke survivors are left with significant disabilities (Duncan, 1994). Disabilities compromise the participation of individuals in essential and meaningful life roles in the areas of self-care, productivity, and leisure (Thorngren and Westling, 1991). Furthermore, stroke survivors often deconditioned and predisposed to a sedentary lifestyle that limits performance of activities of daily living and may contribute to a heightened risk for recurrent stroke (Gordon et al, 2004).

It is estimated that more than 60% of all stroke patients have some functionally limiting disability as

a result of the neurological event (Kojima et al, 1990). Also, nearly three million Americans have some degree of disability from strokes, which has an estimated cost of \$30 billion annually (Adelman, 1981). The individuals who had a stroke have usually cost pressures, so it is needed to minimize costs both to society and individuals suffering.

As for the significant relation between motor recovery and time elapsed since stroke, rehabilitation is less effective when initiated more than 3 months after stroke, as previously reported (Kotila et al, 1984; Shah et al, 1990), and the plateau phase may be reached after a time interval exceeding 1 year (Ahlsio et al, 1984; Bjerneby and Reinvang, 1985). The "plateau" phase is generally defined in rehabilitation as the level from which little or no further recovery is expected (Formisano et al, 1993).

Although physical therapy for patients with more than 1 year after stroke has been shown to be effective (Dean et al, 2000; Duncan et al, 1998; Green et al, 2002; Rodriguez et al, 1996; Wade et al, 1992), some patients continue to progress beyond that time (Rodriquez et al, 1996; Tangeman et al, 1990).

After discharge rehabilitation, it would be logical that the sooner the patient can be returned home following stroke, the sooner the reintegration process can commence (Mayo et al, 2000). After a stroke, although most people are able to walk, many are only able to walk slowly and hesitantly. At the very least, this level of disability may mean that they are unable to walk fast or far enough to cross the road, while at worst they may be unable to even leave the house (Ada et al, 2003). To improve the disable condition, a major component of stroke management is aimed at facilitating functional independence and community reintegration.

Exercise classes are one way to provide ongoing programs to maintain and improve performance after discharge from rehabilitation. Such classes are advantageous because they not only provide the opportunity for exercise and social interaction, but are also cost-effective with several individuals participating at the same time (Dean et al, 2000). However, rehabilitation programs for individuals with stroke have traditionally involved a one-to-one client-therapist ratio due to the close supervision required when challenging balance in these individuals, in addition to the necessary monitoring when taxing their car-

diovascular function. Thus, given the current limited rehabilitation resources, it would be ideal to develop safe and effective community-based group exercise programs that are accessible to larger numbers of individuals (Eng et al, 2003). Also, the community-based group exercise is needed for cost-effectiveness.

Community-based group exercise programs for the persons who experienced a chronic stroke are uncommon in Korea. It is also not known whether a community-based group exercise program is effective or not. The purpose of this study is to evaluate the balance and occupational performance effects of eight weeks community-based functional exercise in chronic stroke persons.

Methods

Subjects

Twenty-five community dwelling individuals with stroke were recruited from the Jecheon Community Center. Of this group sixteen individuals met the following criteria: (1) first stroke resulting in hemiplegia; (2) have an activity tolerance of 60 min with rest intervals; (3) able to walk 10 m with rest intervals with or without an assistive device; (4) scored more than 24 on the Mini-Mental State Examination (MMSE). Subjects were excluded if they had any medical condition that would prevent participation in a training program. Participant characteristics are described in Table 1.

Table 1. Participant characteristics

Variable	n	Mean±SD	Range
Sex (M/F)	8/8		
Affected side (L/R)	9/7		
Age (yrs)		60.50±9.04	43~75
Time since stroke (yrs)		8.95±5.56	2~20
MMSE*		26.31±1.97	24~30

*MMSE: Mini-Mental State Examination

Outcome Measures

The Canadian Occupational Performance Measure (COPM) and the Berg Balance Scale (BBS) are used as outcome measures. The COPM is an outcome instrument designed to detect change in self-perception of occupational performance over time. Subjects are asked to identify their own problems in the areas of self-care, productivity, and leisure. Subjects then rate their perceived performance and perceived satisfaction on a 10-point scale for each of the five most important problems. Ratings for the five problems are summed and divided by five for a Performance Score and a Satisfaction Score. Each with a minimum score of 1 and maximum score of 10 with higher scores indicating better perceived performance or higher levels of satisfaction. The COPM was reported good test-retest reliability (intraclass correlation coefficients > .80) for this particular outcome measure in individuals in outpatient rehabilitation settings (Law et al, 1994; Law et al, 1998).

The BBS consists of 14 tasks such as reaching, balancing on one limb, and transferring and a score range of 0 to 56. The BBS is using a 5-point (0~4) scale to rate each item, with 0 indicating an inability or need for maximal assistance to complete the task or performs task with safety concerns and 4 indicating independent and safe ability to perform task. This test has been shown to be a valid and reliable measure of balance in stroke (Berg et al, 1992; Berg et al, 1995).

Intervention

Subjects participated in 1 hour of functional group exercise at the community center twice a week for 8 weeks. The subjects were trained by one physical therapist under the one-to-one supervision of students in the department of physical therapy.

The functional exercise program comprised light aerobic warm-up (e.g., deep breathing, arm swing, ROM exercise), stretching (e.g., calf stretches, hamstring stretches), functional upper exercise (e.g., moving arm up and down with clasped two hands, bends and extends his elbows with hands remaining

extended against the wall), functional lower exercise (e.g., repetitive rise from a chair, moving up and down with standing the back against the wall), weight-shifting and walking (e.g., lunges of affected and unaffected side in different direction, repeated marching in place), balance (e.g., repeated rising up on toes, repetitive of standing from a wall and backwards with the trunk straight to contact the wall and bouncing upright again), and cool-down (e.g., deep breathing, arm swing).

Statistical Analysis

A Wilcoxon Signed Rank Test was used to compare with the initial measure of COPM and Berg Balance Test and the outcome measure. The statistical software program for Wilcoxon Signed Rank Test was SPSS 11.0. A significant level of $p < .01$ (two-tailed) was selected for all statistical tests.

Results

The 9 individuals of 25 subjects scored less than 24 on the Mini-Mental State Examination. A total of 16 subjects completed the training program and subjects of mean proportion 93.5% attended in classes. Therefore, the data of 16 individuals were analyzed. The results of 16 individuals are shown in Table 2. There was a significant effect for BBS ($p < .01$) and COPM Performance Score & Satisfaction Score ($p < .01$).

Discussion

As for the significant relation between motor recovery and time elapsed since stroke, rehabilitation is less effective when initiated more than 3 months after stroke, as previously reported (Kotila et al, 1984; Shah et al, 1990), however, motor recovery may still occur after this period (Ada et al, 2003; Ahlsio et al, 1984; Duncan et al, 1998; Werner and Kessler, 1996).

Table 2. Comparison of initial and outcome measure in COPM and BBS

Variables		Baseline	Post training	Z
		Mean±SD	Mean±SD	
COPM ⁺	Performance Score	4.12±1.81	5.60±1.65	-3.064*
	Satisfaction Score	4.07±2.09	5.67±1.98	-3.062*
BBS ⁺⁺		42.50±6.97	48.18±6.22	-3.299*

*p<.01

⁺COPM: Canadian Occupational Performance Measure

⁺⁺BBS: Berg Balance Scale

A recent controlled pilot study that evaluated an 8 week circuit training program found improvements in walking speed and 6-min walk distance, in addition to weight bearing ability through the affected limb for the five experimental subjects compared with the four control subjects (Dean et al, 2000). Teixeira-Salmela et al (1999) found improvements in gait and stair climbing speed, in addition to muscle strength from a 10-week muscle strengthening and physical conditioning program for 13 individuals with stroke. Moreover, Duncan et al (2003) reported that a 3-month structured, physiological based, progressive, supervised home-based exercise program improves stroke recovery compared with usual care.

In our study, we found that after community-based functional group training, stroke patients improved in balance and occupational performance. It is worthy of notice that our subjects were a minimum of 2 years poststroke and a maximum of 20 years poststroke. Most of our subjects had no experience with hospital rehabilitation training.

One of the most consistent observations in stroke rehabilitation is that patients spend large proportions of the day alone and inactive (Mackey et al, 1996). These observations suggest that individuals after stroke are at risk of becoming socially isolated and more disabled after discharge from rehabilitation, particularly since most individuals are discharged with functional ambulation skills that are inferior to the level required for effective community ambulation

(Hill et al, 1997; Lerner-Frankiel et al, 1990). Furthermore, maintaining activities that promote mobility and fitness are imperative for the prevention of further pathological events, for examples falls resulting in fracture, recurrent strokes, or cardiac events (Eng et al, 2003).

Consequently, the community-based rehabilitation programs designed to optimize functional motor performance for stroke survivors must include aerobic exercise training, with and without supported walking, to improve strength and timing of muscle activations and cardiorespiratory fitness (Macko et al, 1997; Potempa et al, 1995). Further research is needed regarding whether a functional exercise training program promotes fitness and prevent to falls, recurrent strokes, and cardiac events or not.

Donnelly et al (2004) reported that community-based rehabilitation services play an important role in terms of releasing pressures on hospital beds. In addition, the reduction in hospital stay led to a reduction in hospital costs. Financial handicap frequently accompanies chronic neurologic conditions. Therefore, it suggests that costs needs to be minimized for ongoing programs to be successful and accessible to all. Using existing community resources and facilities may be one way to minimize such costs.

In our case, functional group exercise is carried out at community centers and exercise training cost is not required. More community-based functional group exercise is needed to reduce costs of chronic stroke.

Werner and Kessler (1996) demonstrated that continued outpatient rehabilitation can improve a subject's self-esteem and sense of well being. They also mentioned that receiving functional exercise was particularly helpful because they felt more motivated and knowledgeable regarding their personal and functional goals.

In addition, in this study, most subjects reported that they felt better and more confident after the training. All subjects participated in the program with high compliance and positive attitudes during training. This suggests that to maximize potential and more confident, stroke rehabilitation needs to continue in community-based functional exercise.

In conclusion, a short-term community-based exercise program could improve performance of activities and balance. Also all subjects were satisfied with this program. Further research needs to evaluate whether the functional improvements in community group exercise and needs to analyze how much cost-effective compared with one-to-one hospital based exercise.

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This article was received September 12, 2005, and was accepted November 1, 2005.