

Effects of a Community-based Fall Prevention Exercise Program on Activity Participation

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Abstract. [Purpose] This study was conducted to identify the effects of a fall-prevention exercise program on the participation and static balance of elderly persons in daily life roles. [Subjects] Ten participants over 65 years of age (75.29 ± 2.93) who were healthy community-dwellers (two men and eight women) were recruited. [Methods] The participants exercised three times a week for eight weeks. The exercise program was based on the fitness and mobility exercise (FAME) protocol. The outcome measures were changes in activity participation level and the fall index. [Results] After the exercise, the activity participation level significantly increased, and the fall index significantly decreased. [Conclusion] A fall prevention exercise program can have a positive effect on participation and static balance in older adults.

Key words: Exercise, Fall, Participation

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INTRODUCTION

In the case of elderly individuals over 65 years of age, physiological changes caused by the aging process lead to vulnerability with regard to safety issues, much more so than in younger age groups. Elderly individuals were reported to be 10 times more likely to be injured by falling on the floor¹⁾. Therefore, a dramatic increase in the elderly population will increase the frequency of falls. Interventions to prevent falls in the elderly have been widely studied. These have focused on the rate of falls, impairment of body function (e.g., strength and reaction time), and performance of tasks or activities. However, besides physical functioning, falls affect social participation functioning, such as participation in social activities²⁾. Participation is defined by the World Health Organization as involvement in daily life situations³⁾. Participation is one of three components of function in the International Classification of Functioning, Disability and Health (ICF). Participation restriction has an adverse effect on social interactions, employment, mobility (use of transportation), and community, social, and civic life⁴⁾. Recent studies found that the incidence of participation restriction was increased in individuals at risk of

falling, those with a history of falls, or those with a fear of falling^{2, 4, 5)}. In addition, individuals with health conditions likely to affect functioning reported that their level of participation at a social level was more important than their physiological level or individual level of functioning⁶⁾. Although participation is a key component of functioning and an important goal of rehabilitation, it is not measured consistently in ageing research. Korea's local social welfare programs concentrate on physical activities for elderly individuals with impairments, with insufficient focus on interventions aimed at increasing participation⁷⁾. Therefore, this study aimed to determine the ability of a fall-prevention exercise program to enhance the participation of community-dwelling elderly individuals in South Korea.

SUBJECTS AND METHODS

The study was carried out from March 2012 to May 2012 at the C City Health Center. Ten participants over 65 years of age (75.29 ± 2.93) who were living in the local area (two men and eight women) were selected. The selection criteria were as follows: no cardiovascular disease relating to blood pressure or heart rate; a score of over 24 points on the Mini-Mental State Examination-Korean version (MMSE-K); ability to communicate and understand the study content; no vestibular system, vision or hearing impairments; no loss of limbs; no fractures in the previous year; and ability to sign a consent form after being informed about the study's purpose and procedure. All the participants read and signed an informed consent form approved by the Inje University Ethics Committee for Human Investigations

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prior to participation.

The exercise program was based on the fitness and mobility exercise (FAME) protocol⁸, which comprises balance and muscle strength training. The FAME protocol is a local community exercise program that was designed in 2006 in Canada in order to enhance the sense of balance and muscle strength of elderly individuals over 65 years of age who are in danger of having a stroke or an injury caused by falling. The exercise class was comprised of balance specific, individually-tailored, and targeted training for dynamic balance, strength, bone, endurance, flexibility, gait and functional skills; training to improve “righting” or “correcting” skills to avoid a fall; backward-chaining; and functional floor exercises. A full description of the exercise program and progression has been published⁸. The exercise program was performed for one hour three times per week (one session/group program, two sessions/home program) by one trained physical therapist and two occupational therapists. The FAME protocol pamphlet was distributed to the participants in the home program, who were required to keep a daily written record of the number of exercises they performed.

Tetra-ataxiometric posturography (Tetrax[®], Sunlight Medical Ltd., Israel) was used to measure static balance, which indicated the fall index. Lower points represent lower risks of falling⁹. The modified version of the Activity Card Sort (ACS) of Lee et al., the Korean Activity Card Sort (K-ACS), was used¹⁰ to evaluate the contents of the activities of the elderly subjects, as well as their participation levels. The K-ACS has 80 items divided among four categories: instrumental activity of daily living, low-intensity physical activity, high-intensity physical activity, and social activity. This study used the community-living version. The test-retest of the reliability of the K-ACS for local community elderly individuals was reported to be 0.87¹⁰. Data were analyzed SPSS version 19.0 (SPSS Inc.). The levels of participation in activity and static balance were compared by paired *t*-tests before and after the intervention. The level of statistical significance was set at $\alpha=0.05$.

RESULTS

After the exercise, activity participation and static balance showed significant differences ($p<0.05$). The activity participation increased from 22.90 ± 5.55 to 32.35 ± 11.16 points, and the fall index decreased from 64.60 ± 27.00 to 51.40 ± 22.84 points. However, there were no statistically significant differences in any category for activity participation before and after the intervention.

DISCUSSION

This study provides evidence that a fall-prevention exercise program may improve participation in daily life roles and static balance in older people. Previous studies on the effects of exercise programs have mainly focused on the impact of the intervention on elements such as the rate of falls and body function¹¹. Studies investigating the impact of falls on participation are lacking. Fairhall et al.¹² conducted a meta-analysis of the effect of interventions on par-

ticipation, including exercise for the prevention of injuries caused by falling. They reported that the effectiveness of exercise programs was slight. As all the previous studies have focused only on the effect of falls on physical functioning, the results are difficult to evaluate properly with respect to changes in the level of participation in daily life/social activities. In this study, the level of participation was evaluated by the K-ACS, which was modified to fit the culture of Korea. The ACS, which the K-ACS is based on, has rarely been used to evaluate participation in fall prevention exercise studies. The ACS has frequently been used as a tool for evaluation of participation in rehabilitation interventions¹¹. It is considered a valid and reliable assessment tool created to assess participation¹³. The ACS constructs cover eight of the nine activities and participation domains of the ICF. They focus on the community, social, and civic life (48%) and domestic life (21%) domains of the ICF. The ACS was developed within the Person-Environment framework, which was later incorporated in the Person-Environment-Occupation-Performance model. Its ultimate goal is to assess activity participation in the instrumental, leisure, and social activities domains¹¹.

This study targeted community fall prevention for the elderly using the FAME protocol. This single intervention proved as effective in reducing falls as other successful community-based programs reported in the literature, and it may be more effective^{14, 15}. In a previous study, a multifactorial intervention with an exercise component had a larger effect than exercise intervention alone, but the difference was not statistically significant¹⁰. The ICF framework describes participation as the result of a complex interaction between an individual's personal characteristics, local and physical environment, impairments, and activity limitations. The framework is supported by evidence that affective cognitive variables are important mediators of the relationship between impairment and avoidance of activities and decreased social participation² and that environmental modifications improve participation outcomes¹⁶. Therefore, future research needs to investigate the optimal intervention to increase participation. As the current study includes only a small number of healthy elderly individuals, it is difficult to generalize the findings. Further research should focus on using larger numbers of clients with different diagnoses. In addition, the level of participation needed to promote the effectiveness of exercise programs and to enhance affected areas needs to be analyzed. Interventions should also take account of individual variations among the elderly and the impact of different types of restrictions on their social functioning. Participation is an important component of functioning and is considered a critical outcome of successful intervention. However participation measures are infrequently included in research related to fall prevention exercise programs. We recommend ongoing evaluation of participation outcomes and research into the efficacy of interventions to increase participation in older people. Interventions to promote participation would improve social integration and quality of life in older people.

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