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Original Article

# Effects of Recreational Exercises on the Strength, Flexibility, and Balance of Old-old Elderly Individuals

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**Abstract.** [Purpose] The purposes of this study were to investigate the effects of recreational exercises on the muscle strength, flexibility, and balance of old-old elderly individuals over the age of 75 years. [Subjects and Methods] Forty-three old-old elderly subjects (aged 78.7 ± 2.9 years) participated in 8 weeks of recreational exercises. The exercises were performed twice a week for 8 weeks. Muscle strength, flexibility, and balance were evaluated by the Senior Fitness Test before and at the end of the intervention. [Results] Significant improvements in muscle strength, flexibility, and balance were observed at the end of the intervention. [Conclusion] This study demonstrated that an intervention using recreational exercises effectively improves the muscle strength, flexibility, and balance of old-old elderly individuals.
**Key words:** Balance, Old-old elderly, Recreation exercise

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## INTRODUCTION

Lamoureux et al.[1)] reported that people's strength decreases as they age, and that this occurs rapidly after the age of 75 years. The frequency of falls increases after the age of 75 years[2)]. However, old-old elderly people over the age of 75 years have little opportunity to participate in regular physical activities, making it more difficult for them to increase their physical activity and thus increase their strength[1, 2)]. Many interventions aimed at reducing fall rates have been studied. Traditionally, fall prevention exercises for elderly people have involved lower-extremity resistance and balance training[3)]. Well-designed exercise programs can prevent falls among community-dwelling older adults[4)]. However, one weakness of conventional exercise is low levels of motivation[5)]. Standage et al.[6)] described the importance of intrinsic motivation in exercise programs. Graves et al.[7)] reported that exergaming focuses on the fun of video gaming while providing the health benefits of physical activity. Unfortunately, exergaming requires expensive equipment and an appropriate interior space. Older adults often refrain from participating in regular physical activity because of perceived barriers such as financial constraints and the lack of an environment conducive to physical activity and exercise programs[8)]. However, recreational exercises provide motivation for exercise without expensive equipment. Thus, the objective of this study was to examine the effect of recreational exercises on fitness strength, flexibility, and balance of old-old elderly individuals.

## SUBJECTS AND METHODS

The subjects of this study were 43 community-dwelling old-old elderly individuals over the age of 75 years (78.7 ± 2.9 years, mean ± SD) with an average height and weight of 150.13 ± 4.67 cm and 57.44 ± 7.50 kg, respectively. Each subject provided informed consent before participating in this study. This study was approved by the Inje University Faculty of Health Sciences Human Ethics Committee. The exercise program used several pieces of equipment, manufactured by NewSport. Such as foam hemispheres and foam croquet equipment, Equipment made of foam is appropriate for old adults with a risk of falling because of its softness and safety. The participants performed recreational twice weekly programs over a period of 8 weeks, a total of 16 sessions. Each exercise session lasted for 60 minutes, with 10 minutes of warm-up, 40 minutes of the main exercise, and 10 minutes of cool-down. The exercise program comprised four types of exercise: badminton, foam croquet, foam hemisphere walking, and balance beam walking. The Senior Fitness Test (SFT) was developed as a safe and enjoyable test method for elderly people, whether inactive or very active, which meets scientific standards of reliability and validity[9)]. The individual fitness test items are common activities such as getting up from a chair, walking, lifting, bending, and stretching. They include: arm curl, back scratch, rising from a chair, chair sit and reach, 8-feet up and

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go, and 6-minute walk. Before the tests were started, a 5- to 10-minute warm-up and general stretching exercises were performed. Performance of each part of the test was preceded by a demonstration, then the subjects checked their ability to perform the test to become familiar with its proper course. The collected data were statistically analyzed using Windows SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). The paired t-test was used to determine the significance of the difference between the pretest and post-test SFT results to evaluate the program's effectiveness. The significance level was chosen as $p < 0.05$.

## RESULTS

There were statistically significant improvements in all items (the 30-second chair stand, right arm curl, left arm curl, chair sit and reach, right back scratch, left back scratch, and 8-feet up and go) after the intervention ($p < 0.05$). The 30-second chair stand results were pre, 12.02 (±4.62), and post, 17.16 (±5.32). The right arm curl results were pre, 14.86 (±9.15), and post, 18.40 (±12.47). The left arm curl results were pre, 15.35 (±8.96), and post, 18.91 (±13.06). The chair sit-and-reach results were pre, 5.33 (±7.37), and post, 8.86 (±7.25). The right back scratch results were pre, −11.14 (±15.11), and post, −6.37 (±13.14). The left back scratch results were pre, −14.49 (±14.17), and post, −9.62 (±12.67). The 8-feet up & go results were pre, 8.98 (±2.41), and post, 6.30 (±1.80).

## DISCUSSION

Recreational exercises for this old-old elderly group resulted in statistically significant improvements in strength, flexibility, and balance during walking. Cahow et al.[10] examined the effects of therapeutic recreation on the quality of life (QOL) of patients with spinal cord injury. Participation in therapeutic recreation and community activities during rehabilitation predicted a higher motor Functional Independence Measure score. Recreational exercises effectively improve physical abilities. Our study showed that such exercise is effective at improving the muscle strength, flexibility, and balance of old-old adults. The recreational exercises performed in this study utilized NewSport equipment, which is commonly used in schools and in research because of its flexibility and simplicity. These characteristics make NewSport equipment ideal for assessing the physical and cognitive characteristics of elderly individuals, such as muscle weakness, balance instability, and cognitive impairment. Recently, some studies showed aquatic exercise and hippotherapy were effective at arousing the motivation of the elderly[11, 12], but the old-old elderly refrain from participating in regular physical activities due to financial constraints and physical ability. Recreational exercises not only arouse interest and motivation, but are also inexpensive.

## REFERENCES


1) Lamoureux EL, Sparrow WA, Murphy A, et al.: Differences in the neuromuscular capacity and lean muscle tissue in old and older community-dwelling adults. J Gerontol A Biol Sci Med Sci, 2001, 56: M381–M385. [Medline] [CrossRef]
2) Rogers ME, Rogers NL, Takeshima N, et al.: Methods to assess and improve the physical parameters associated with fall risk in older adults. Prev Med, 2003, 36: 255–264. [Medline] [CrossRef]
3) Granacher U, Muehlbauer T, Zahner L, et al.: Comparison of traditional and recent approaches in the promotion of balance and strength in older adults. Sports Med, 2011, 41: 377–400. [Medline] [CrossRef]
4) Gillespie LD, Robertson MC, Gillespie WJ, et al.: Interventions for preventing falls in older people living in the community. Cochrane Database Syst Rev, 2012, 9: CD007146. [Medline]
5) Fitzgerald D, Trakarnratanakul N, Smyth B, et al.: Effects of a wobble board-based therapeutic exergaming system for balance training on dynamic postural stability and intrinsic motivation levels. J Orthop Sports Phys Ther, 2010, 40: 11–19. [Medline] [CrossRef]
6) Standage M, Sebire SJ, Loney T: Does exercise motivation predict engagement in objectively assessed bouts of moderate-intensity exercise? A self-determination theory perspective. J Sport Exerc Psychol, 2008, 30: 337–352. [Medline]
7) Graves LE, Ridgers ND, Williams K, et al.: The physiological cost and enjoyment of Wii Fit in adolescents, young adults, and older adults. J Phys Act Health, 2010, 7: 393–401. [Medline]
8) Rosenberg D, Depp CA, Vahia IV, et al.: Exergames for subsyndromal depression in older adults: a pilot study of a novel intervention. Am J Geriatr Psychiatry, 2010, 18: 221–226. [Medline] [CrossRef]
9) Adamo DE, Talley SA, Goldberg A: Age and task differences in functional fitness in older women: comparisons with senior fitness test normative and criterion-referenced data. J Aging Phys Act, 2014, [Epub ahead of print]. [Medline] [CrossRef]
10) Cahow C, Gassaway J, Rider C, et al.: Relationship of therapeutic recreation inpatient rehabilitation interventions and patient characteristics to outcomes following spinal cord injury: the SCIRehab project. J Spinal Cord Med, 2012, 35: 547–564. [Medline] [CrossRef]
11) Kim SG, Lee CW: The effects of hippotherapy on elderly persons' static balance and gait. J Phys Ther Sci, 2014, 26: 25–27. [Medline] [CrossRef]
12) Lim HS, Roh SY, Yoon S: An 8-week aquatic exercise program is effective at improving gait stability of the elderly. J Phys Ther Sci, 2013, 25: 1467–1470. [Medline] [CrossRef]