The effects of horse-riding simulator exercise on balance in elderly with knee osteoarthritis

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Abstract. [Purpose] The aim of this study was to examine the effects of horse-riding simulator exercise on balance in elderly with knee osteoarthritis. [Subjects and Methods] Fifty elderly patients with knee osteoarthritis were recruited, a horse-riding simulator group performed exercise three times a week for eight weeks. And each exercise was performed for 30 minutes. [Results] The horse-riding simulator group showed significant differences after the intervention in Short Form Berg Balance Scale, Functional reaching test. [Conclusion] The results of this study indicate that horse-riding simulator exercise is effective on knee osteoarthritis. Therefore, horse-riding simulator exercise can be used balance training for knee osteoarthritis.

Key words: Knee osteoarthritis, Balance, Horse-riding simulator

INTRODUCTION

Balance is very important in daily activities of the elderly and greatly affects their quality of life. Due to age-related changes, balance ability deteriorates. Osteoarthritis is a degenerative disease that causes severe pain in elderly patients with low pain thresholds. Research has shown that it results in a high disability score, low quality of life, and limited range of motion, in addition to weak muscle strength, poor balance ability, and high risk of falls1–5). As osteoarthritis causes severe pain and functional disorders, in general, the clinical treatment is focused on pain management and amelioration of related disorders. The treatments include muscle strength training, electrical stimulation, manual therapy, aquatic therapy, balance therapy, and pharmacotherapy6).

As balance ability and falls are closely related in the elderly, exercise therapies need to focus on the maintenance of such ability7). Horseback riding exercise is one such therapy. In research conducted by Araújo et al. 8) where elderly individuals performed horseback riding exercise for eight weeks, the researchers reported that the exercise significantly improved the participants’ balance and muscle strength. Unlike other interventions, horseback riding exercise can arouse the interest of patients and motivate them while improving their balance, bone density, muscle strength, and mental state9–11). According to some studies, horseback riding exercise increased the static muscular contraction of the rider against the movement of the horse and improved the muscle strength in the quadriceps femoris and knee flexors of young riders12, 13). Most people do not indulge in horse riding because of where they live (i.e., urban rather than rural areas) or the costs and risks involved in horse riding. Hence, simulator horseback riding exercise equipment using virtual reality has been developed for use at home and in small spaces. Previous studies reported that horseback riding exercise significantly increased oxygen intake, minute ventilation, MET, calorie consumption, and muscle14, 15). Although various therapeutic approaches have made with horseback riding exercise in the previous studies there is a lack of research on the effects of horseback riding exercise equipment on the balance and gait abilities of elderly patients with osteoarthritis.
SUBJECTS AND METHODS

Experimental procedures were performed in accordance with the protocols established by the Institution of Animal Care and Use Committee (IACUC) at the Daegu University.

Include criteria was aged 65 years or over (Table 1), and with a history of none falls in previous year, lower pain for perform experiment, and visual or auditory damage, nervous system or of the vestibular organ problems, who can’t understand the contents of the experiment were excluded. After providing information study all subjects received a participation agreement.

In this study, the subjects, while providing conventional physical therapy, 8 weeks three times a week the movement of the horse riding equipment, was carried out for 30 minutes. Before performing horse riding simulation exercise, subjects were educated about exercise program through a research assistant’s demonstration. In this study, used the SlimRider (Shinhwa,MX-0004SE, Korea), which is a horse riding simulator. While performing a horse riding equipment exercise, subjects were effort to maintain the correct posture. Exercise intensity was increased gradually according to the state of the subjects while performing the exercise, the research assistant were always observed to prevent falling.

In order to evaluate the balance of the elderly, it was using the FRT (Functional reach test) and SBBSF (Short form berg balance scale). All of the measurement results were expressed as mean ± standard deviation.

The SPSS for Windows (version 18.0) was used for data analysis of the study. In order to compare the differences between before and after, it was analyzed using the paired t-test. Statistical significance level was set at α=0.05.

RESULTS

In this study, SFBBS scores and range of FRT increased significantly after Horse riding simulator exercise (Table 2).

DISCUSSION

Osteoarthritis causes severe pain in elderly patients who have a low threshold for pain and high disability scores, thereby resulting in a low quality of life, increased risk of falls, and poor balance ability.1,2,6 In the present study, the static, dynamic, and functional balance abilities of osteoarthritis patients who undertook horseback riding exercises on exercise equipment were measured using a FRT and SFBBS. The SFBBS score increased significantly after the intervention. The findings are in accordance with those of study that stroke patients performed horseback riding exercise for 35 min five times a week for eight weeks and Araújo3 in which elderly patients performed horseback riding exercise for eight weeks. They are also in accordance with the results of Han Jun-young16 in a study of stroke patients who performed horseback riding exercise for 12 weeks that an eight-week-long horseback riding exercise significantly improved the BBS scores of osteoarthritis patients. In general elderly, the average BBS score is 20.60 ± 4.0817. In the present study, the scores of the elderly participants were lower than average before the exercise. After eight weeks of the exercise, the average score was 22.3 ± 4.4, higher than the average. The results suggest that horseback riding exercise equipment can improve dynamic and functional balance abilities.

Furthermore, according to the FRT results, the static balance ability of the participants improved. These results are in line with the research findings of Yasuhiro et al.18 and Kim Sung-gil19 where the FRT scores improved significantly after 12-week-long and 8-week-long horseback riding exercise, respectively. An increase in the FRT score is considered an improvement in static balance ability. Based on the findings of the present study, horseback riding exercise equipment seems to improve the static balance ability of the elderly.

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REFERENCES


