



THE EFFECT OF THE OTAGO EXERCISE PROGRAM AND BRIDGING EXERCISE IN THE ELDERLY WITH THE RISK OF FALL IN RSUD PROF. DR. MARGONO SOEKARJO PURWOKERTO : A CASE REPORT

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Abstract

Introduction: Falls` is the third leading cause of disability among the elderly and a public health problem with major social impacts worldwide in countries with significantly aging populations. More than 30% of people over the age of 65 fall each year and half of the cases fall again. Dynamic balance and leg muscle strength have a close relationship with the risk of falling. Reduced hip muscle activity also affects the body's ability to maintain balance which has negative consequences on functional performance.

Case Presentation: Mr. IW is 74 years old with complaints of pain from the lower back sometimes radiating to the left side of the leg since 1 year ago. The left lower leg feels heavy and the pain increases when doing strenuous activities and walking long distances. Complaints reduced with rest. The patient's history of comorbidities has heart disease and gout.

Management and Outcome: Patients received the Otago Exercise Program and Bridging Exercise in 1 month with a prescribed dose. Based on the results of the BBS examination, 30 second Chair Stand, TUG Test, and the Indonesian version of the ODI modification, there was an increase in balance and muscle strength of the lower extremities as well as an increase in functional activity seen in patients

Discussion: History of low back pain that can causes changes in balance and postural control so that it has a higher postural sway and greater displacement of the center of pressure. For the elderly to be able to enjoy a healthy life and be free from worries about accidents that result in bruises such as falls, they need good muscle strength and balance skills. Lower leg muscle weakness is one of a predictor of falls. Another study found that regular exercise, lumbar muscle strengthening exercises and balance exercises were effective in preventing injury in the elderly and improving the function of the sensory-motor system, which is necessary to keep the body safe. The specially designed OEP consists of strengthening and balance exercises targeting and improving dynamic balance outcomes in the elderly. Core strengthening exercise in the form of Bridging Exercise can restore the body's postural control function and increase range of motion and is considered an appropriate exercise for the elderly.

Conclusion: Physiotherapy programs for the elderly at risk of falling using the Otago Exercise Program and Bridging Exercise can improve balance and muscle strength in the lower extremities as well as increase the ability to functional activity in elderly individuals.

Keywords : Elderly, Older Adults, Geriatric, Fall Risk, Bridging Exercise, Otago Exercise, Physiotherapy

Introduction

Falls are the third leading cause of disability among the elderly and a public health problem with major social impacts worldwide in countries with significantly aging populations [1]. More than 30% of people over the age of 65 fall each year and half of the cases fall again. About one in ten falls result in a serious injury such as a hip fracture, other fracture, subdural hematoma, or traumatic brain injury [2]. Balance that declines with age is a complex sensory-motor process in which the visual, vestibular and musculoskeletal systems work together to produce postural stability. In addition, proprioception, the neural input from mechanoreceptors distributed throughout the human body, worsens with aging and affects balance thereby increasing the risk of falling. In addition, aging adversely affects the joint structure as a result of which the performance of physical activities will be negatively affected. Dynamic balance and leg muscle strength also have a close relationship with the risk of falling. Therefore, improving these factors can reduce the frequency of falls and their costs. Therefore, an exercise program that includes strength and balance is needed to prevent falls in the future [3]. One of the exercise interventions that can be used is The Otago Exercise Program (OEP), in the form of exercises designed to prevent falls in the elderly. This exercise program is home-based consisting of balance and strengthening exercises adjusted to one's needs [4]. Those who received OEP experienced improvements in cognitive function and a reduction in the incidence of falls [3]. Reduced hip muscle activity affects the body's ability to maintain balance, which could have negative consequences on functional performance. In addition, the hip muscles are responsible for the correction of large balance errors, while the ankle muscles are responsible for the correction of small errors. If the motor control of the hip muscles is reduced, the risk of injury may increase [5]. Another study found that regular exercise, lumbar muscle strengthening exercises and balance exercises were effective in preventing injury in the elderly and improving the function of the sensory-motor system, which is necessary to keep the body safe. Core strengthening exercises are effective for lumbar stabilization and motor control training, so they are widely used as key exercises to maintain body balance [6]. Perform Bridging Exercise (BE) is also one of the quick and easy training methods to strengthen the back and gluteus muscles [7]. The purpose of this study was to determine the effectiveness of the physiotherapy program using the Otago Exercise Program and Bridging Exercise on the balance ability and lower extremity muscle strength as well as increasing the ability of functional activities in elderly individuals.

Case Presentation

Mr. IW is 74 years old with complaints of pain from the lower back sometimes radiating to the left side of the leg since 1 year ago. The left lower leg feels heavy and the pain increases when doing strenuous activities and walking long distances. Complaints reduced with rest. The patient's history of comorbidities has heart disease and gout. Examination of vital signs shows normal conditions in all aspects (blood pressure, respiratory rate, pulse/heart frequency, temperature), especially for the patient's blood pressure being controlled because he regularly takes medicine from the doctor. The inspection results obtained a flat back and gait pattern disturbances, antalgic gait. Based on the results of palpation found a spasm in the medial lower back, m. gluteus and m. tibial anterior. Pain was assessed using the Visual Analogue Scale (VAS) with a score of 0 (no pain) to 100 mm or 10 cm (very painful) from the average and maximum levels of pain during the previous week [8]. The Berg Balance Scale (BBS) examination identifies early problems in postural control and for predicting fall risk in older adults. The BBS assesses general activities of daily living, such as assisting, standing, turning the trunk and reaching forward. The minimum score for each item varies between 0 (unable to perform tasks) and 4 (able to perform tasks independently), with a maximum score of 56 points [9]. The 30-second Chair Stands examination is a functional evaluation clinical test to measure lower body strength and relate it to activities of daily living (e.g., climbing stairs, getting down from a chair or bath or rising from a horizontal position) [10]. The Timed Up & Go Test takes

additional cognitive challenges such as walking straight on executive function through initiation and sequence; transfer and activate cognitive processing speed. Several cognitive domains including attention, memory, visual spatial abilities and executive function are further challenged when walking to maintain balance and prevent falls. The patient was asked to perform a TUG, instructed to rise from an armless chair (46cm height), walk 3 meters and turn around on cone placement, walk backwards, and sit down again. They were instructed to walk at a normal pace with or without a walker and shoes. Time was recorded when the participant's buttocks were lifted from the chair to stand and stopped when the buttocks touched the chair when returning to a sitting position [11]. Examination of functional activities using the Indonesian version of the Modified Oswestry Disability Index in the form of a measuring tool containing a list of questions or questionnaires designed to provide information on how much disability level is low back pain in performing daily activities [12].

Management and Outcome

The patient did the Otago Exercise Program and Bridging Exercise for 4 weeks. The Otago Exercise Program is a home-based strength and balance retraining program for individuals designed by physiotherapists. Consists of 5 strengthening exercises (knee extensor, knee flexor, hip abductor, ankle plantar flexors, ankle dorsiflexors) and 11 balance exercises (knee bends, backward walking, walking and turning around, sideways walking, tandem stands, tandem walking, 1-leg stand, heel walking, toe walking, heel-toe walking backward, and sit to stand) with a progression from the lowest level and increasing level of difficulty over time [4]. The program prescribed for patients with a frequency of 3 times a week with an intensity of 2 sets, 10 repetitions consisting of three exercises for balance (tandem stands, tandem walk, sit to stand) and two strengthening exercises (ankle plantar flexors; calf-raises, ankle dorsi flexors; toe raises). Core strengthening exercises are very helpful for muscle strengthening exercises, joint exercises, and balance exercises, because they help improve flexibility and stability [6]. This exercise is often used for lumbopelvic stabilization for patients with LBP. This exercise focuses on retraining muscle coordination patterns where the optimal ratio between local and global segmental stabilizing muscle activity that generates torsion is considered important. The patient was instructed to contract with the transverse abdominis, multifidus, and pelvic floor muscles to perform the bridging position. The position during the bridging exercise, the subject is in the supine position, then raises their pelvis until a hip flexion angle of zero degrees is produced [13]. This position is done with a frequency of 5 times a week with an intensity of 2 sets, 10 repetitions [6]. The results of the VAS measurement from the first to the fourth therapy. Frequency of pain on T1 with pain at rest: 3.5, pain on palpation: 5.8, pain on movement: 4.8. At T2 pain at rest: 3.3, pain on palpation: 5.4, pain on movement: 4.7. At T3 there was an increase in the frequency of pain because the patient's uric acid level increased and affected the walking mobility of the patient with pain at rest: 3.7, pain on palpation: 4.3, pain on movement: 6.6. On T4 with pain at rest: 3.2, pain on palpation: 4, pain on movement: 4.2. At the initial examination of BBS, the results of the examination with a score of 30 indicated the patient had a high risk of falling and had not been able to perform at the single leg stand point because of the fear of falling. At T4 BBS examination was carried out and there was an increase in the result score to 34 and was able to do a single leg stand even in a short time. The results of the initial examination of the 30 second Chair Stand, the patient was only able to stand 8 times for 30 seconds with the cutoff score for age 70-74 (men) was 12 standing. At T4 the patient was able to do 11 times standing for 30 seconds indicating an increase in lower extremity strength. The initial TUG examination with a result of 13.54 seconds with a cut-off score of > 13.5 seconds indicated the patient could have a risk of falling in the future. At T4 the TUG result decreased to 11.26 seconds indicating an increase in mobility, balance, walking ability and a decreased risk of falling in the patient. Examination of functional activity with modified ODI obtained a score of 34% with the interpretation of the patient having moderate disability. At T4

re-examination was carried out with the results of 30% indicating an increase in functional ability, especially when walking and carrying out social life activities.

Discussion

The patient has a history of low back pain that causes changes in balance and postural control due to compensatory changes in posture and muscle activation patterns as a strategy to limit spinal movement and avoid movements that trigger pain. Thus, the patient has a higher postural sway and a greater displacement of the center of pressure [1] Up to 70% of people who have recently fallen and up to 40% of those who have not reported falling admit to being afraid of falling. The patient's psychological condition is also afraid of falling even though he has never fallen before resulting in reduced physical and functional activity associated with stress and fear of falling. Having four or more drugs is also involved in phobia related to falling. Up to 50% of those who are afraid of falling limit or exclude social or physical activity because of this fear [2]. Researchers have focused on investigating the causes of falls in older adults. Dynamic balance and leg muscle strength have a profound relationship with fall risk [3]. Balance can be negatively affected in the normal population through fatigue in the muscles around the ankles, knees, and hips. Studies have found, muscle fatigue around the hips (glutes and lumbar extensors) and the knee has a greater effect on postural stability (wobble). It's thought that muscle fatigue causes a decreased ability to contract with the correct amount of force or accuracy. As a result, proprioception and kinesthetic feedback from the joint are altered so that conscious joint awareness can be negatively affected [14] For the elderly to be able to enjoy a healthy life and be free from worries about accidents that result in bruising such as falls, they need good muscle strength and balance skills [6]. The designers of the Otago Exercise Program focused on increasing lower extremity strength which usually diminishes with age. A specially designed home-based exercise consisting of strengthening and balance exercises targets and improves dynamic balance outcomes in the elderly. The prescribed program is intended to be safe for the elderly to be carried out every day without professional supervision [3]. Another study found that regular exercise, lumbar muscle strengthening exercises and balance exercises were effective in preventing injuries in the elderly and improving the function of the sensory-motor system which is necessary to maintain a safe body. Core strengthening exercise in the form of Bridging Exercise can restore the body's postural control function and increase range of motion and is considered an appropriate exercise for the elderly. Bridging exercises also effective for the lumbar stabilization and training of motor control, so that they are widely used as a key exercise to maintain body balance [6]. Based on the results of reassessment of the BBS examination, 30 second Chair Stand, TUG Test, and the Indonesian version of the ODI modification, there was an increase in balance and muscle strength of the lower extremities as well as an increase in functional activity seen in patients and could be related to the effect of the exercise program specified in this study.

Conclusion

Physiotherapy programs for the elderly at risk of falling using the Otago Exercise Program and Bridging Exercise can improve balance and muscle strength in the lower extremities as well as increase the ability functional activity in elderly individuals.

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