



Effect of Otago exercise program on balance and risk of fall in community-dwelling individuals having knee osteoarthritis

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ABSTRACT

Aim: To study the effect of Otago exercises program on balance and on the risk of fall in community-dwelling individuals having knee osteoarthritis. **Purpose:** Otago exercise program is an individually tailored home-based programme which will help the elderly to reduce fall risk. Hence we are going to check whether Otago exercise program is helpful in reduction of fall and improve balance in community-dwelling individuals having knee osteoarthritis. **Study Design:** – Experimental Study. **Procedure:** Consent of the patients will be taken. The importance of the Otago exercises will be explained to the patient. The procedure and treatment duration will be explained. Firstly at the first-week score of Time up and Go Test and Berg Balance Scale will be noted. **Intervention for 1 month** will be given. Lastly, at the 4th week again the scored will be checked. **Result:** The result of the Berg Balance Scale shows, Mean pre-intervention was 36.77 and post-intervention was 45.7, $P=0.0001$ and $t= 9.466$. The result of time up and go test shows, Mean pre-intervention was 40.87 and post-intervention was 28.07, $P=0.0001$ and $t= 17.147$. After comparing within the group it is observed that pre and post-intervention were considered to be significant. **Conclusion:** According to the findings of my study we conclude that Otago exercise program is effective in increasing strength and balance. Thus it is effective in reducing the risk of fall in the older adult.

Keywords— Otago exercise program, Balance, Strengthening, Berg balance scale, Time up and go test

1. INTRODUCTION

Falls are a common and often devastating problem among older people, causing a tremendous amount of morbidity, mortality, and use of health services including premature nursing home admissions.¹ Alterations in the ability to execute smooth, accurate, controlled motor responses occur with aging. The importance of understanding the basis of these changes is reflected in the large and ever-expanding body of literature devoted to examining a various aspect of motor performance in older adults.² The Otago Exercise Program is an individually tailored, home-based balance and strength fall prevention program. It was developed by John and Clare, Ph.D., researchers at the University of Otago in New Zealand and the New Zealand Falls Prevention Group.³ This programme is unique in its clearly defined prescription and ability to be readily implemented across the community. Most of these falls are associated with one or more identifiable risk factors (e.g. weakness, unsteady gait, confusion, and certain medications).³ Diminished strength is well documented in the elderly. Sarcopenia refers to an age-associated loss of skeletal muscle mass decreased cross-sectional area) as well as changes in the ability of muscle tissue to regenerate.^{2,3} This loss has a direct impact on strength, endurance, mobility, the ability to perform smooth control motor responses.² Falls include dropping from a standing position or from exposed positions such as step ladders. According to the WHO global report on fall prevention in older age, risk factors for falls involve biological, environmental, behavioral and socioeconomic factors.² Most common predictors of falls are abnormalities in gait or balance and a past history of fall.³ Osteoarthritis (OA) is a chronic disease that can change the lifestyle of the affected person by producing pain and decreasing function; OA can result in loss of mobility, pain, disability, and dependence.⁴ Biomechanical, immunologic, and biochemical factors are involved in cartilage destruction, which is at the core of OA; growth factors may play a role in the body's attempts to repair cartilage through cartilage synthesis.⁴ Excessive wear and tear changes on joints contribute to OA development; secondary nonspecific inflammatory changes in the joints also may contribute, so the former term "degenerative joint disease" is no longer used for OA. In early OA, increased chondrocyte metabolism leads to the increased proteolytic breakdown of the cartilage matrix. Fibrillation and erosion of the cartilage surface ensue and proteoglycan and collagen fragments are released into the synovial fluid, stimulating a chronic inflammatory response in the synovium; metalloproteinases and cytokines produced by synovial macrophages can diffuse back into the cartilage and directly or indirectly destroy tissue. Other proinflammatory molecules may also be a factor. In addition to a breakdown of the articular cartilage, OA involves the entire joint complex, including synovium and

subchondral bone. Grossly, cartilage fissuring, pitting, and erosion are seen and can progress to the point that large areas of the joint surface are denuded of cartilage; bone underlying denuded cartilage becomes sclerotic. Simultaneously, cartilage and bone proliferate (a self-repair attempt), especially at the joint margin, leading to marginal osteophytosis. Genetic factors, obesity, and decreased bone density may make OA more likely to occur.⁴ Impaired balance and increased postural sway (oscillating movements of the body over feet during relaxed standing) both occur with advancing age. In my study for assessment of fall and balance we are using 1) Time Up and Go test and 2) Berg Balance Scale. ⁽²⁾ Time Up and Go test is used to assess a person's mobility and requires both static and dynamic balance. Berg Balance Scale is to measure balance among older people with impairment in balance function by assessing the performance of functional tasks which has a 14-item scale designed to measure the balance of the older adult.²

2. RESULTS

The result of the Berg Balance Scale shows, Mean pre-intervention was 36.77 and post-intervention was 45.7, $P=0.0001$ and $t= 9.466$. The result of time up and go test shows, Mean pre-intervention was 40.87 and post-intervention was 28.07, $P=0.0001$ and $t= 17.147$. After comparing within the group it is observed that pre and post-intervention were considered to be significant.

3. DISCUSSION

After completion of my study we observed that 4 weeks of Otago exercise program is useful in the treatment of elderly having fall risk. For the prevention of fall, not only balance but also strength training is important. For the elderly, with proper instructions and guidance, the exercises were carried out. Osteoarthritis is the most common joint disease that affects the elderly and age is one of the most important risk factors for the disease.⁴ Synovial fluid is the fluid that surrounds the joints. It helps to protect cartilage which is the tissue that covers the ends of the bones against damage caused by friction during movement.⁴ Strengthening and balance exercises mainly lower limb strengthening is cost-effective in the prevention of fall. For walking, both static and dynamic balance is needed. Due to which ability to maintain the projection of body's center of mass within manageable limits of base of support is essential.³ As the effects of aging are considered, systems like sensory, central processing, neural pathways for motor control and musculoskeletal system enabled the contribution of physiologic systems to be evaluated. Diminished strength is a well-documented finding in the older adult. So the study proved that along with balance strength is also an essential element of fall prevention.

The balance consists of ongoing postural adjustments and anticipatory and thus a coordination task. Spink et al said that exercises that focused on muscles of ankles and feet were considered to be important components of successful podiatry fall prevention trial.³ The study conducted basically aimed at lower limb strength training and postural muscles. Balance retraining, minimal upper extremity and walking use delivered at a moderate intensity to achieve results. The changes were expected in order to reduce fall risk as moderate intensity strengthening and balance retraining exercises were provided to the elderly. To challenge the elderly more, walking was implemented lastly in order to serve the purpose to reduce accidental falls.³ Otago showed increased in lower limb strength and balance they were improved by walking and turning around, heel to toe walking and stair walking. These factors are important predictors or causes of walking. In addition, through stair walking, the patient practiced with fixed foot support, acceleration, balance control, contraction of the lower limb and ankle dorsiflexion to move the center of gravity to control the afferent, efferent, and contraction of lower limb muscles. By improving the parameters there can be a drastic change in the pattern of walking and help gain confidence in the elderly while walking.³

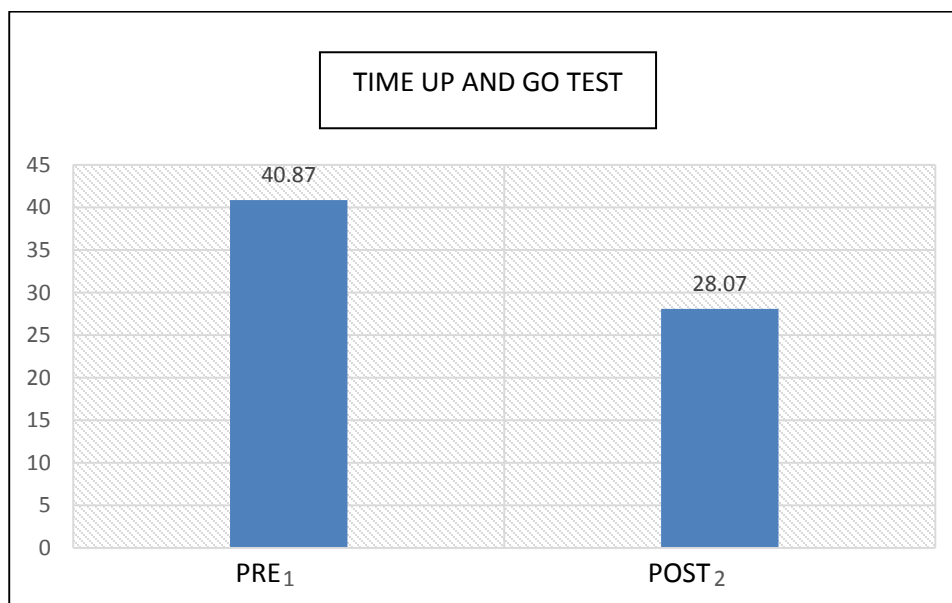


Fig. 1: Time up and go test

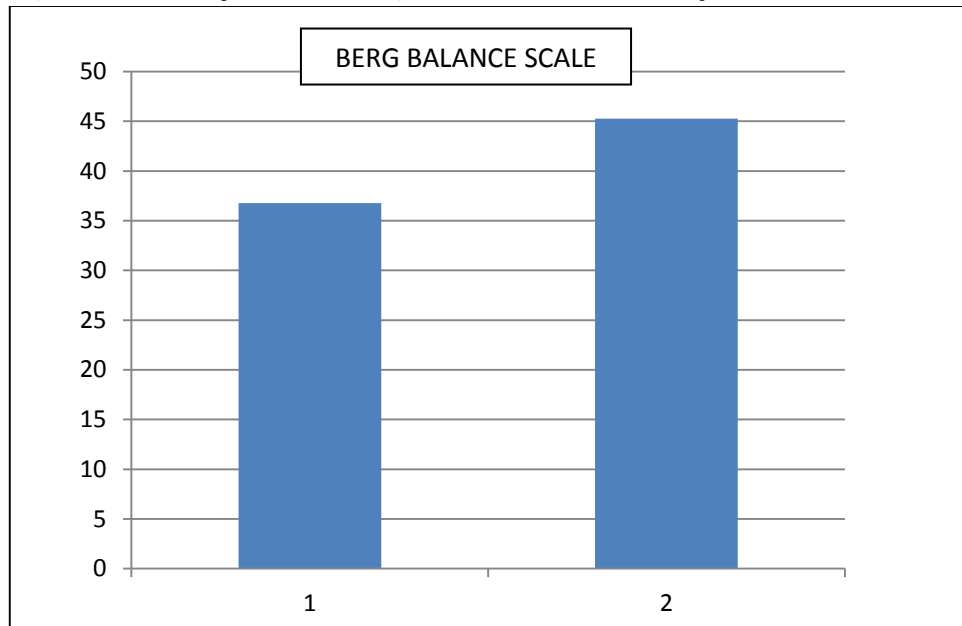


Fig. 2: Berg balance scale

4. CONCLUSION

According to the findings of my study we conclude that Otago exercise program is effective in increasing strength and balance. Thus it is effective in reducing the risk of fall in the older adult.

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