

# The Effect of Balance Training on Fall Risk Reduction in Older Adults with Osteoporosis

Thamer M. Alshammery<sup>1</sup>, Ahmed A. Alzahrani<sup>2</sup>, Mohammed S. Aldakhil<sup>3</sup>,  
Alhassan A. Alsharif<sup>4</sup>

Physical Therapists  
Health affairs at the Ministry of National Guard

## Abstract:

This research investigated the impact of a structured balance training program on fall risk reduction in older adults with osteoporosis. A randomized controlled trial was conducted with 100 participants aged 65 and above, diagnosed with osteoporosis. The intervention group received a 12-week balance training program, while the control group received standard care. The results showed a significant 40% reduction in fall incidence in the intervention group compared to the control group. Furthermore, participants in the intervention group demonstrated improvements in balance assessments, including a 5-point increase in the Berg Balance Scale scores and a 2-second reduction in the Timed Up and Go test times. Participant feedback indicated increased confidence in balance and mobility. High adherence rates and satisfaction with the program were also observed. These findings suggest that structured balance training programs can effectively reduce fall risk and improve balance in older adults with osteoporosis, highlighting the importance of incorporating such interventions into comprehensive care strategies for this population.

**Keywords:** Balance training, older adults, osteoporosis, fall risk reduction, randomized controlled trial, Berg Balance Scale, Timed Up and Go test.

## Introduction:

Osteoporosis is a common bone disease characterized by decreased bone density and increased susceptibility to fractures, particularly in older adults. An estimated 200 million individuals affected with osteoporosis worldwide, with a higher prevalence among older populations (Reginster, 2006). The consequences of osteoporotic fractures, such as hip fractures, can be severe and lead to increased morbidity and mortality in older adults.

In addition to fractures, individuals with osteoporosis face an elevated risk of falls due to factors such as impaired balance, muscle weakness, and decreased mobility. Falls are a leading cause of injury and mortality among older adults, highlighting the importance of fall prevention strategies in this population (Rubenstein, 2006). Balance training has emerged as a promising intervention to improve balance, gait stability, and reduce fall risk in older adults with osteoporosis (Overstal, 2003).

Despite the growing interest in balance training as a preventive strategy, there is a need for further research to elucidate its specific effects on fall risk reduction in individuals with osteoporosis. This study aims to address this gap by investigating the impact of a structured balance training program on fall incidence and related outcomes in older adults with osteoporosis.

## Literature Review:

Osteoporosis is a significant health concern affecting older adults, particularly postmenopausal women, characterized by decreased bone density and an increased risk of fractures (Consensus Development

Conference, 1991). Older adults with osteoporosis are not only at risk for fractures but also for falls due to factors such as impaired balance, muscle weakness, and decreased bone quality.

Numerous studies have highlighted the association between osteoporosis and increased fall risk in older adults. For example, a study by Fink i et al. (2008) found that individuals with osteoporosis had a higher incidence of falls compared to those without osteoporosis, emphasizing the need for effective fall prevention strategies in this population. Falls, in turn, can result in fractures that further exacerbate the complications associated with osteoporosis (Trombetti et al., 2011).

Balance training has emerged as a key intervention to address balance deficits and reduce fall risk in older adults with osteoporosis. Previous research by Howe et al. (2011) demonstrated that a multi-component exercise program, including balance training, significantly improved balance and reduced the risk of falls in older adults with osteoporosis. Similarly, a meta-analysis by Sherrington et al. (2011) supported the effectiveness of balance training programs in reducing fall rates in older adults.

Despite the existing evidence supporting the benefits of balance training, there remains a need for further research to explore the specific effects of balance training interventions on fall risk reduction in individuals with osteoporosis. This study aims to contribute to the current literature by investigating the impact of a structured balance training program on fall incidence and related outcomes in older adults with osteoporosis.

## **Methodology:**

### **Study Design:**

A randomized controlled trial (RCT) was conducted to investigate the effect of a structured balance training program on fall risk reduction in older adults with osteoporosis. Participants were randomly assigned to either the intervention group, which received balance training, or the control group, which followed standard care without additional intervention.

### **Participants:**

The study included 100 community-dwelling older adults (aged 65 and above) diagnosed with osteoporosis. Participants were recruited from outpatient clinic for orthopedic at military hospital. Inclusion criteria included a diagnosis of osteoporosis confirmed by bone density testing and the ability to walk independently with or without assistive devices.

### **Intervention:**

The intervention group participated in a 12-week balance training program conducted by licensed physical therapists. The program consisted of progressive balance exercises targeting core stability, lower limb strength, and proprioception. Sessions were held three times a week for 60 minutes each, with exercises tailored to individual abilities and progress.

### **Outcome Measures:**

Fall incidence was the primary outcome measure, recorded using fall diaries kept by participants throughout the study duration. Secondary outcome measures included balance assessments using the Berg Balance Scale (BBS) and the Timed Up and Go (TUG) test administered at baseline and post-intervention.

### **Data Analysis:**

Descriptive statistics were used to summarize participant characteristics at baseline. A logistic regression analysis was conducted to determine the effect of the balance training program on fall risk reduction, adjusting for potential confounding factors. Changes in balance scores pre- and post-intervention were analyzed using paired t-tests.

### **Ethical consideration :**

Approval obtained from ethics committee and informed consent gained from all participants.

## Findings:

## 1. Fall Incidence:

- The intervention group (balance training) showed a 40% reduction in fall incidence compared to the control group.

Group	Fall Incidence (Before)	Fall Incidence (After)	Percentage Reduction
Intervention	20 falls	12 falls	40%
Control	18 falls	20 falls	-11%

## 2. Balance Assessments:

Assessment Tool	Baseline Score (Mean $\pm$ SD)	Post-Intervention Score (Mean $\pm$ SD)	Improvement (Mean Change)
Berg Balance Scale	40 $\pm$ 5.2	45 $\pm$ 4.0	5 points
Timed Up and Go Test	12 seconds $\pm$ 1.5	10 seconds $\pm$ 1.0	2 seconds reduction

## 3. Participant Feedback:

- 90% of participants in the intervention group reported improved confidence in their balance and mobility.

Feedback Aspect	Intervention Group (%)	Control Group (%)
Improved Confidence	90%	25%
Satisfaction with Program	85%	40%
Likelihood to Recommend	95%	30%

## 4. Adherence Rates:

- The average adherence rate to the balance training program was 95% among participants who completed the full 12-week intervention.

**Discussion:**

The findings of this study suggest that structured balance training programs have a positive impact on fall risk reduction and balance improvement in older adults with osteoporosis. The significant 40% reduction in fall incidence observed in the intervention group reflects the effectiveness of structured balance training interventions in mitigating fall risk in this vulnerable population. These results are consistent with previous research demonstrating the benefits of balance training in improving stability and reducing fall rates in older adults (Howe et al., 2011; Sherrington et al., 2011).

The improvements in balance assessments, as evidenced by the 5-point increase in the Berg Balance Scale scores and a 2-second reduction in the Timed Up and Go test times, further support the effectiveness of the balance training program. These improvements are crucial for enhancing mobility, reducing the risk of falls, and ultimately improving the quality of life for older adults with osteoporosis.

The high participant feedback regarding improved confidence in balance and mobility (90% in the intervention group) and satisfaction with the program (85%) highlights the acceptability and perceived benefits of the intervention. Participants in the intervention group were also significantly more likely to recommend the balance training program compared to those in the control group (95% vs. 30%), indicating a high level of satisfaction and perceived efficacy among participants.

The adherence rates to the balance training program were generally high, with the majority of participants demonstrating good compliance with the intervention. This underscores the feasibility and acceptability of incorporating balance training programs into the management of osteoporosis in older adults. However, efforts

to improve adherence among all participants, particularly those with lower adherence rates, may further enhance the effectiveness of such interventions in real-world settings.

Limitations of this study include the relatively small sample size and the short duration of the intervention. Future research with larger sample sizes and longer follow-up periods is recommended to validate the long-term effects of balance training on fall risk reduction and balance improvement in older adults with osteoporosis.

### **Conclusion:**

In conclusion, the findings of this study highlight the potential of structured balance training programs to reduce fall risk, improve balance, and enhance confidence and mobility in older adults with osteoporosis. These results support the integration of balance training interventions as part of comprehensive care strategies for individuals with osteoporosis to promote healthy aging and prevent fall-related injuries.

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