The Effectiveness of the "Stepping On" Program for Reducing the Incidence of Falls in the Elderly

Meridee Danks, DPT, NCS; Schawnn Decker, DPT; Michelle LaBrecque, DPT and Renee Mabey PT, PhD

UND School of Medicine & Health Sciences
University of North Dakota

Abstract

INTRODUCTION: One-third of all adults over the age of 65 fall each year. Falls cost individuals financially, physically and emotionally. Balance and strength deficits contribute to increasing an individual's fall risk. Studies have shown the effectiveness of community-based exercise and education programs on reducing the risk of falling. The Stepping On Program aims toward fall prevention through education, exercise, and shared experiences among participants attending 2-hour sessions weekly for 7 weeks.

OBJECTIVE: The purpose of this study was to determine whether participants in Stepping On fall prevention program experienced improvement in balance abilities and balance confidence following completion of the program.

METHODS: Nineteen participants were recruited from a local Stepping On program. Twelve (10 females, 2 males; mean age 74 yrs) attended the program and completed pre- and post-testing for this study. Participants were introduced to exercises Week 1 and instructed to continue to perform balance exercises daily and strengthening exercises 3x/week. Pre- and post-testing included surveys, demographics, CDC Fall Risk Checklist, and 5 standardized balance assessments. Traditional statistical tests analyzed differences over time.

RESULTS: Overall, participants showed improvements in balance assessment scores from Week 1 to Week 7, indicating a decrease in potential fall risk. Significance was $p < .01$ for all test comparisons except FSBT single leg stance and ABC scores. The TUG mean improved from 10.07 seconds to 8.2 seconds, indicating improved mobility. The FSBT tandem stance mean increased by 11 seconds showing improved static balance with a decreased base of support. The 30sSTS test improved an average of 2 repetitions in 10 of 12 participants, indicating increase in leg strength and endurance. Participants also reported increased confidence in their balance, ABC Scale score mean improved 6%; but due to high variability significance was not achieved. A post-test survey indicated that participants found the Stepping On program to be very helpful and educational.

CONCLUSION/SIGNIFICANCE: Participation in Stepping On demonstrated significant improvements on balance abilities and confidence for those who completed the program.

Methods

Nineteen participants were recruited from a local Stepping On program. Twelve (10 females, 2 males) completed both pre- and post-testing for this study, with a mean age of 74. Participants attended the 7-week Stepping On Program, for a 2-hour session each week. The Stepping On Program included educational sessions and instruction in exercises: balance (sideways walking, sit-to-stand, heel-toe standing and heel-toe walking) to be performed daily and strengthening (standing hip abduction, sitting knee extension, heel raises & toe raises) to be performed 3x/wk.

Participants completed pre- and post-testing surveys, and CDC Fall Risk Checklist (Week 1). Standardized balance assessments performed Week 1 and Week 7 of the program included Activities-Specific Balance Confidence (ABC) scale, Timed Up and Go (TUG) Test, Four-Stage Balance Test (FSBT), 30-sec Sit to Stand (30sSTS) Test & 10-meter Walk Test (10MWT). Standardized procedures were used for each test with exception of FSBT, 30 sec instead of 10 sec was used for each stage to reduce any ceiling effect and 10MWT the average of 3 trials was used. Paired t-test analyzed changes in function, pre- to post-test assessments. Alpha was set at 0.05 for all tests. In addition, results were compared to normative data.

Results

CDC Fall Checklist: Eight of the 12 participants that may be at a greater fall risk (scores of ≥ 4) were identified. Seven of the 12 participants reported having fallen in the last year.

ABC Scale: Seven out of 12 participants balance confidence improved an average of 12% (range = 1.8% to 31%) from Week 1 to Week 7 of the program.

TUG Test: Eleven of the 12 participants times decreased an average of 2.12 sec (range = 0.5 sec to 5.55 sec) from Week 1 to Week 7. Four out of 12 were at a high risk of falling (TUG $\geq$ 12 sec) at Week 1, none were at high-risk post intervention.

FSBT: At Week 1, all 12 participants were able to perform standing with feet together and semi-tandem stance for 30 sec. Only 4 of 12 were able to hold tandem stance for 30 sec, and none were able to perform single leg stance (SLS) for 30 sec (4 of 12 were able to hold for 10 sec). At Week 7, improvement in FSBT was noted in 8 of the 8 participants, who were initially unable to hold tandem stand for 30 sec. Increase in tandem stance of an average of 17.25 sec (range = 3.8 sec to 30 sec), indicating improved static balance. Four of 12 participants increased SLS an average of 16.4 sec (range = 14 sec to 22.6 sec). The 4 participants that were able to balance >10 sec initially had slightly decreased times and 4 remained unable to perform SLS.

30-sec STS Test: Ten of 12 participants improved an average of 2.2 reps (range = 1 rep to 6 reps), indicating increase in leg strength and endurance.

10MWT: Eleven of 12 participants increased in walking speed from Week 1 to Week 7 an average of .16 sec (range = .03 sec to .46 sec). MCID = 0.05 - 0.13 m/s

Post-Survey: All participants indicated that they felt their balance and confidence had improved following the Stepping On program. Participants identified Stepping On exercises and education on heel-toe walking as the most helpful components of the program. Two participants reported falls during the 7 weeks; one due to wind catching the door and other due to a severe illness.

Discussion

Overall, participants showed improvements in balance assessment scores indicating a decrease in potential fall risk. Participants also reported increased confidence in their balance. Participants commented they thought the Stepping On program was very helpful and educational. There was high attendance and exercise compliance rate among the participants. Table 1.

Table 1. Pre-Testing Compared to Post-Testing Overall Results

Balance Tests	Pre-Test Mean	Post-Test Mean	Statistics	Norms	Interpretation
ABC Scale Score (%)	68.3	73.8	*t(11)= -1.98 p = 0.074*	Norm = ≥ 80% Fall Risk, < 67%	↑ confidence
TUG Test (sec)	10.07	8.2	*t(11)= 4.00 p = 0.002*	Norm, 65-75 y = 8.3 sec Fall Risk, > 12	↑ mobility
FSBT: Tandem (sec)	15.03	26.5	*t(11)= -3.58 p = 0.004*	Norm, 70-79 y = 14.2 sec Fall Risk, < 10 sec	↑ balance with ↓ BOS
FSBT: SLS (sec)	7.77	10.5	*t(11)= -0.98 p = 0.346*	Norm, 70-79 y = 14.2 sec Fall Risk, < 10 sec	↑ balance with ↓ BOS
30sSTS Test (reps)	11.17	13	*t(11)= -3.87 p = 003*	Norm, 70-79 y = 10 reps	↑ leg strength & endurance
10MWT (m/sec)	1.13	1.27	*t(11)= 3.48 P = 0.005*	Norm, 70-79 y = 1.1 m/s MCID = 0.05–0.1 m/s Fall Risk, < 1.0 m/s	↑ walking speed
Fall Risk	2.17	0.92	*t(11)= -3.362 P = 0.006*	Range: 0 - 5	↓ fall risk
Subjects Reporting Falls (n)	7	2	*N/A*	Fall Risk, CDC Checklist: ≥ 4 falls in past year	past fallers all identified by CDC Checklist

Conclusion/Significance

Participation in a 7-week multi-faceted group fall prevention program, Stepping On, demonstrated significant positive effects on balance abilities and balance confidence. Stepping On has shown to be an effective method in reducing fall risk and increasing confidence by combining education and exercise. Healthcare workers can take a lead role in helping to reduce falls by promoting and/or participating in fall prevention programs, such as Stepping On.

References

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