A FEASIBILITY STUDY OF TRIP RECOVERY TRAINING AS A FALL PREVENTION INTERVENTION

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INTRODUCTION

Falls are a major cause of injury and death in adults aged 65+. On average, 5070 older adults are treated every day for a fall-related injury and approximately 37 die every day from a fall-related injury (CDC 2004).

Numerous exercise interventions have been proposed to help prevent falls in older adults (Lord 1995). However, the most effective type, intensity, frequency, and duration of exercise in preventing falls has yet to be identified (Tinetti 2003). An alternative intervention to help prevent falls may be to take advantage of motor learning principles by allowing individuals to practice movements directly related to fall prevention in a safe, controlled setting. The goal of this study was to evaluate the feasibility of trip recovery training as a fall prevention intervention.

METHODS

Twelve healthy community-dwelling older adults (mean 73.3 ± 6.1 years) participated in the study. The experiment employed a two-group pretest-posttest design. Participants were randomly assigned to either an experimental group or control group while keeping an equal number of males and females in each group. Each group performed one trip before (Trip 1) and one trip after (Trip 2) an intervention.

While in a safety harness, participants walked at a self-selected pace along a walkway and were informed that a trip may occur. After a minimum of 20 walking trials, a three-inch high pneumatically-driven obstacle in the floor was triggered to elicit a trip which rose in approximately 160 ms from time of activation.

After Trip 1, the experimental group performed trip recovery training on a modified treadmill. Once activated, the treadmill accelerated to 2.0 mph in ~190 ms. Subjects were instructed to step over an obstacle and recover their balance. Twenty trials were performed. The control group walked on the treadmill at 2.0 mph for 15 minutes (the approximate time it took to complete the trip recovery training). After the interventions, both the control and experimental groups were tripped again while walking along the walkway after a minimum of 20 walking trials.

Whole body kinematics, ground reaction forces, and forces applied to the harness were recorded during randomly selected walking trials as well as during Trip 1 and Trip 2. Trip recovery performance was quantified using several measures derived from the kinematic data. Measures included the maximum trunk flexion, maximum trunk angular velocity, minimum hip height, as well as the time to maximum trunk flexion and maximum trunk angular velocity.

To determine the effect of the trip recovery training on trip recovery performance, difference values were calculated between the two trips (Trip 2 - Trip 1), and a t-test was performed between the two groups.
RESULTS AND DISCUSSION

Nine of 11 participants successfully recovered their balance after both trips, one participant failed only after Trip 1, and one participant failed after both trips.

Several measures of trip recovery performance exhibited changes from Trip 1 to Trip 2 that were consistent with greater improvements in the experimental group compared to the control group. Maximum trunk flexion and time to maximum trunk flexion decreased significantly from Trip 1 to Trip 2 in the experimental group, while minimum hip height increased significantly from Trip 1 to Trip 2 in the experimental group (p<0.05) (Figure 1). No other variables of trip recovery performance were different between groups.

SUMMARY/CONCLUSIONS

Overall, the results suggested beneficial effects of trip recovery training on actual trip recovery. The trip training showed a decrease in maximum trunk flexion and arresting the forward rotation of the trunk has been shown to be a key factor in successfully recovering from a trip (Grabiner 1993). The beneficial effects of trip recovery training may be due to changes in “neural factors” elicited by motor learning. Trip recovery training may allow modification of muscle activation levels and muscle activation sequences to occur via motor learning to improve balance recovery.

In conclusion, trip recovery training on a treadmill had beneficial effects on recovery from an actual trip. Future studies should further examine the ability to retain improvements in trip recovery performance over extended periods without training or non-exposure to a trip, and optimize the training to maximize the beneficial effects.

REFERENCES


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