

RESEARCH ABSTRACT

PROPRIOCEPTION TRAINING AND FALL PREVENTION

By Ashlee Jones

Falls are the leading cause of fatal and non-fatal injuries for those aged 65 and older. An estimated one in three older adults fall every year: 30 percent of these falls results in a moderate to severe injury, such as a hip fracture, or even depression based on the fear of falling.

This fear can lead to inactivity, which further decreases an elderly individual's postural stability, gait and balance.

Several studies and authors indicate that dynamic proprioception training is linked to decreasing the risk of falls. Proprioception is awareness of one's body position. As we age, this system decreases in function, thus increasing the risk of falls.

Dynamic proprioception training utilizes unstable surfaces, such as an exercise ball or a stability trainer, to challenge an individual's core strength. Advancing core stability improves postural steadiness with walking, turning and reaching.

The purpose of this study was to compare the effects of traditional and proprioceptive training programs on postural stability, gait and balance, and fall prevention in adults aged 65 and older.



Unstable surfaces such as a stability trainer challenge core strength to improve postural steadiness.

METHODS

This study comprised 44 subjects aged 65 and older. Baseline characteristics were collected on the participants through:

- A self-administered questionnaire ("Have you experienced a fall to the ground in the last 12 months?").
- Pre- and post-intervention assessments on stability tests with "eyes open" and "eyes closed."
- Tinetti and Berg tests (functional tests to objectively determine a patient's ability to complete tasks safely; identifies falls risk).
- A force platform assessment (measures the amount of sway associated with changes in weight bearing).

A control group was asked not to change activity levels during the 12-week intervention. The experimental group participated in a proprioception intervention program for two days per week. Each exercise session was 50 minutes (10 minutes warm-up, 30 minutes proprioceptive exercises, and 10 minutes cool-down). As the participants improved with the exercises, training was progressed into two or three phases.

RESULTS

The experimental group significantly improved on stability tests with "eyes open" and

"eyes closed"; on postural control during anterior-posterior and medial-lateral movements on the force platform; and on scores on the Tinetti and Berg balance tests.

DISCUSSION

Although aging is inevitable, the risk of falling can be prevented. No matter the living situation of the older adult, it is important to address balance for improved quality of life. Reoccurrence of falls in individuals older than 65 tends to result from the loss of agility and dynamic control during activities of daily living.

Maintaining a level of physical activity is important for improved steadiness during walking, turning and reaching activities. This study showed that participation in proprioception exercises has a positive effect on gait, postural stability and balance in older adults.

Another significant piece of fall prevention is guidance by a physical therapist, who can take an older individual through a challenging proprioception exercise regime to decrease the risk of falling. ▀

REFERENCE

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DELICATE BALANCE

By Jessica Heath and Neal Goulet

Life, it turns out, literally is a balancing act. And the longer we live, the more challenged we are to stay on our feet.

Consider that more than 30 percent of people aged 65 and older will fall this year. If you reach age 80, your odds of falling increase to better than 50 percent.

And it gets worse for some.

In 2012-2013, according to the Centers for Disease Control and Prevention (CDC), falls caused 55 percent of all unintentional deaths among adults aged 65 and older. This far outpaced the number of injury deaths caused by motor vehicle accidents in that age group.

Among other staggering numbers about falls, which while skewing toward the older population can negatively affect all ages:

- One out of five falls causes a serious injury such as broken bones or a head injury.
- More than 95 percent of hip fractures are caused by falling, usually by falling sideways.
- The direct medical costs for fall injuries is \$31 billion annually. That figure could reach \$54 billion by 2030.

THREE BODY SYSTEMS

Aging is but one of many factors that contribute to a balance disorder, or dysfunction, a condition that makes you feel unsteady or dizzy when walk-



Falls result when something health-based or environmental, such as stairs, challenges balance or strength.

ing or standing.

Muscle weakness, joint stiffness, inner ear problems, medications and sedentary lifestyle also can contribute to balance problems. Common medical conditions can play a role, too, including diabetes, arthritis, stenosis, high blood pressure, heart conditions, macular degeneration.

Progressive neurological disorders, such as multiple sclerosis and Parkinson's disease, also present with balance dysfunctions and can affect independence and safety.

Problems occur when one or more of three body systems are not working properly:

- Visual
- Vestibular (inner ear)
- Somatosensory, which includes proprioception (awareness of one's body position), sensation, pain, movement, muscles and joints.

"The brain coordinates impulses from the eye, inner

ear, and body-position senses, and sends signals to the muscular system to move or make adjustments to maintain balance. If one or more of the senses is not send-



Scan for video on fall prevention.

ing correct signals to the brain, or if the muscular system cannot carry out the necessary movements, a person may not be able to maintain or correct their balance," according to MoveForwardPT.com.

More simply put, falls result when something, whether health-based or environmental (stairs, sloping ground, poor lighting), challenges our balance or strength.

SCREENING FOR RISKS

Balance problems can manifest as tripping, swaying, stumbling, dizziness, vertigo, and, worst of all, falling. Standing still or performing a single task may not be troublesome, but moving about or doing more than one thing at a time (walking while turning your head to speak with another person) can become problematic.

A person challenged in these ways can grow fearful of performing daily activities, in the process losing muscle strength as a result of avoiding strenuous movements.

"Some of the major consequences of falls among older adults," according to the CDC, "are hip fractures, brain injuries, decline in functional abilities, and reductions in social and physical activities."

The more risk factors a person has – older victims typ-

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ically have two or more – the greater the chance of falling. But while factors such as advanced age or a history of falls can't be changed, many more can be modified (see sidebar on page 3) to assist in fall prevention.

The American Geriatrics Society recommends that all adults aged 65 and older be screened for falls. The Journal of Geriatric Physical Therapy, in a review of 33 other studies, identified 17 independent contributing factors in fall risks for “community-dwelling” older adults. It found “significant interaction” between risk factors and a patient's function level.

The Journal of Geriatric Physical Therapy proposed that physical therapists screen all older adults seen in their practices, with a positive screen

triggering a comprehensive fall-risk assessment.

COMMON QUESTIONS

A physical therapist will ask questions and/or perform tests related to motion, strength, coordination, vision and balance. The results will help determine whether a patient should see a physician or be referred to physical therapy for a formal evaluation and customized treatment program that can reduce fall risk and fear of falling.

Some common questions that might be asked are:

How often do you experience problems with your balance?

What types of activities are you doing when you experience problems with your balance?

Do you have any sensation of the room spinning, or do you feel off-balance?

Have you had any falls in the past year? How many? Have any resulted in injury?

Have you changed or decreased your activities out of the home because of your balance or fear of falling?

If a fall risk is identified, physical therapy will address mobility issues such as walking speed, balance and proprioception, strength, flexibility, posture and pain.

The goals will be to improve function and daily activity.

This will help to counter instances of patients limiting their activities; for example, someone who is older and has a history of diabetes, resulting in neuropathy (peripheral nerve damage); knee pain caused by arthritis; or an injury caused by a fall.

Each patient should be evaluated carefully so that a detailed, tailored treatment plan can be developed. ▾

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FALL-PREVENTION TIPS

To prevent falls, focus on modifiable risk factors:

- Talk to your health care provider. Ask for an assessment of your risk for falls. Share any chronic conditions and any history of falls.
- Review your medications with your doctor and pharmacist. Don't forget over-the-counter medications or herbal supplements.
- Talk to a physical therapist about a balance assessment and exercise program to build balance, strength and flexibility.
- Get your vision and hearing checked annually.
- Talk to your family members. Enlist their help to take steps to make your home safer. ▾

CASE STUDY

ALL BALANCE COMPONENTS

By Courtney Myers

PATIENT HISTORY

A 71-year-old male presented to outpatient physical therapy with complaints of imbalance and dizziness after oral medication treatment for hematoma (blood) on his brain. He noted that his overall level of mobility was affected and reported several near falls.

He described difficulty with activities such as yard work, showering and grocery shopping along with overall increased fatigue. The patient had a history of nasal cancer, Type 2 diabetes, polyneuropathy and macular degeneration.

ASSESSMENT

The patient presented with reduced hip strength and range of motion. He had an inconsistent response with testing of sharp/dull sensations on the plantar surface of both feet, indicating a possible loss of sensation.

He displayed severe loss of balance with static testing, deteriorating with his eyes closed or with a change of surface. When asked to turn his head, the patient demonstrated decreased walking speed, walking off to the sides versus maintaining a straight path, and frequent loss of balance.

Vestibular hypofunction (a poorly functioning vestibular system) was apparent given the above findings. However, additional impairments influenced his balance and needed to be addressed.



TREATMENT

Treatment consisted of manual stretching of hip flexors and extensors, gluteal and general lower extremity strengthening, and vestibular exercises. He performed vestibular ocular reflex (VOR) exercises, static and dynamic balance activities on both compliant (stable) and noncompliant (unstable, such as foam or balance board) surfaces, and activities with visual suppression (eyes closed). Anodyne (infrared) treatment was incorporated to both feet to improve sensation.

OUTCOME

After 12 physical therapy treatments focused on all three of the primary balance systems (vestibular, visual and somatosensory), the patient displayed remarkable improvement. The patient reported improved balance with general activities of daily living, including decreased need for upper

extremity assistance while showering and decreased fear of imbalance or falls. The patient noted improved sensation in his feet while driving. His Activities-specific Balance Confidence Scale score improved from 81.3 percent confidence to 92.5 percent confidence.

SUMMARY

Patients with balance problems can present with multiple system deficits. In addition to vestibular impairments, we must consider injury to both the somatosensory (proprioception, sensation, range of motion and strength) and visual systems.

Physical therapists have the tools to incorporate exercises and improve these deficits to provide the best care available. It is important to consider all balance components. ▾

FALL-PROOF YOUR HOME

Make these simple changes to help prevent falls and eliminate hazards in various parts of your house.

Kitchen

- Never stand on chairs or boxes to reach cabinets or shelves. Use a step stool with a bar to hang on to.
- Store food, dishes and cooking equipment in easy-to-reach places.
- Immediately clean up any liquid or food spilled on the floor.



Bathroom

- Place a slip-resistant rug next to the bathtub for safe entry and exit.
- Use a non-slip rubber mat or non-slip strips in tub or shower.
- Install grab bars for support inside the tub and next to the toilet.
- Replace glass shower enclosures with non-shattering material.

Stairs and Steps

- Always keep objects off stairs.
- Fix any loose or uneven steps.
- Provide enough light to see each stair and landing.
- Make sure carpet is firmly attached to every step.
- Make sure handrails are on both sides of the stairs.