

DO ELDERLY BALANCE DISORDER PATIENTS BENEFIT FROM THE SPORTKAT MACHINE?

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ABSTRACT

Previous studies suggest that age, disease, weakness, and injuries all increase the risk of falls. Several assessments are also used to evaluate an individual's stability through gait (walking) and balance; one such test is the Tinetti Balance and Gait Assessment. Functional dynamic balance activities are a core treatment for balance disorder patients, but a new innovative tool may be an additional treatment for these patients. This tool is called the SportKAT machine, which challenges the proprioceptive, vestibular, and visual systems that make up our equilibrium. The purpose of this study was to see if balance disorder patients benefit more from both treatments rather than the floor activities alone. No participants were observed, although data from 24 elderly balance deficit patients were compared with the Tinetti Assessment from the SportKAT users to the non-SportKAT users. The results concluded that the SportKAT users did improve more overall, yet both groups improved with therapy.

INTRODUCTION

Muscles and bones in the body maintain balance. There are three key factors to stabilize the body's equilibrium: vision, internal sense of spatial orientation (proprioception), and the inner ears. Balance is important in that it prevents people from falling and maintaining our center of gravity (COG) so we can stand up straight on two legs. It sounds easy enough, yet many elderly people have a difficult time when becoming unsteady. Many factors include: poor posture, decreased balance of support (BOS), disease, loss of strength and endurance, a recent fall, and/or vertigo symptoms, etc. (SportKAT, 2005).

Many patients with vestibular or gait instability troubles may seek help with medications or physical therapy. Recently, a new product has come available for balance disorder patients to use along with functional floor activities during therapy. This product is called the SportKAT machine (SportKAT, 2005), and it is an innovative tool for the evaluation on rehabilitation of balance deficits. K.A.T. stands for Kinesthetic Ability Trainer. It enables the body's proprioceptors to interpret the sensory input that it receives from external and internal sources, including vestibular input from the inner ear, and visual input from the eyes (SportKAT, 2005).

Means, et al (1998) used a functional obstacle course (FOC) to measure balance and mobility in an elderly population. Performance was compared with the Tinetti Index of Gait and Balance Assessment and postural sway on a force platform. After testing the subjects with the FOC, results concluded that the Tinetti Assessment supported the measurements for dynamic balance while the postural sway measured a different aspect

of balance. The Timed Up and Go and Functional Reaching tests are two other common assessments used when evaluating stability and gait.

Healthy elderly subjects have also been studied for balance. Camicioli, et al (1997) examined several healthy, very old subjects and younger elderly subjects using quantitative posturagraphy. He found that the older population had worse quantitative equilibrium scores compared with the younger elderly subjects when proprioception input was inaccurate and visual input was completely absent. The older population seemed to fall more frequently during posturagraphy, and they found that the balance measures correlated with age and functional measures of balance. Other studies, such as one conducted by Overstall (1992), have also found that the risk of falling increases with age. He states that age has a critical effect on reducing the efficiency of central information processing, which has a crucial role in preventing falls.

Maki, et al (1994) suggests from a one-year study with independent elderly volunteers, that the best way to predict the risk of a fall is from the lateral-spontaneous sway during gait. Plenty of research is being conducted to prevent falls and understand why so many elderly people have a balance deficit. The purpose of this study is to see if balance-disorder patients who come to physical therapy for prevention of falls or unsteadiness really do benefit from using the SportKAT machine and functional floor activities, rather than floor activities alone.

METHOD

PARTICIPANTS

No human subjects were questioned or observed, although previous recorded data from their medical charts were obtained in a confidential manner. All 24 elderly (65 and older) balance-disorder patients were randomly selected, and had been treated in the past year. Of the 24 participants, ten patients had not used the SportKAT machine while the other 14 participants had.

MATERIALS

Materials included 24 medical charts from patients with a balance deficit. The Tinetti Balance and Gait Assessment was also used as an objective scale for stability (see Appendix). The SportKAT machine was also necessary to obtain information from the patients who had used the machine.

PROCEDURE

After the researcher received permission from her boss to gather data for her study; she started randomly selecting medical charts for patients with a balance disorder and who were evaluated using the Tinetti Balance and Gait Assessment within the past year. The researcher selected a total of 24 charts, ten of which had not used the machine and 14 who had. Then, the data was gathered from the patient's initial visit until their last visit using the Tinetti scale comparing the SportKAT users to the non-users.

RESULTS

A 2 x 2 mixed-design ANOVA was calculated to examine the effects of balance treatment (SportKAT and functional activities or only functional activities) and time (before and after) on scores. A significant Treatment x Time interaction was present ($F(1, 22) = 4.87, p < .05$). The main effect for treatment was significant ($F(1, 22) = 16.56, p < .05$). The main effect for time was also significant ($F(1, 22) = 88.48, p < .05$).

DISCUSSION

The data concludes that the subjects who used the SportKAT machine did benefit more from their treatment than the non-SportKAT users. Both groups improved overall according to their Tinetti Assessments. The time and treatment factors were both significant, in that they both play important roles in therapy for balance and gait. Although the non-SportKAT users had a greater improvement throughout therapy, the SportKAT users started out with a better score. The purpose of this study was established after reviewing the results, which shows that the SportKAT is an innovative tool for patients with a balance deficit.

As stated earlier from Maki (1994) and Overstall (1992), the risk of falls increases with age and if someone has a lateral sway to their gait they may be prone to a balance or gait deficit. This treatment may be a great tool to prevent their condition from progressing and increasing their risk of falls. The results were expected because a patient usually improves from their treatments and becomes aware that they do have a balance deficit and want to correct it.

The researcher believes this study generalizes well with the elderly population and others who may have a gait or balance problem, but not with young, healthy individuals. Although, the younger individuals could learn from this study, and would be aware of a treatment that helps to prevent a balance deficit if they ever come upon this condition. One limitation from this study is that many participants reached a ceiling effect, where they could no longer improve on the Tinetti Gait and Balance Assessment. A suggestion for future research is to use another scale for scoring the patient's balance or use patients with lower scores. Another idea is to compare genders, age, ethnicities, or re-test the same participants after a year from their original treatment. The researcher would also recommend using the same experimenter with the patients to make sure their treatments are valid with the other patients.

This was a ground study that should be branched off and replicated to ensure ourselves of the most beneficial treatment for a balance or gait insufficiency. Although many of the patients were at a risk of falling on their initial visit, they all improved with therapy. Both treatment groups challenged the patients' proprioceptive, vestibular, and visual areas to promote neuromuscular re-education and protect them from becoming unsteady.

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APPENDIX

Tinetti Assessment Tool: Balance

Patient: _____ Date: _____

Location: _____ Rater: _____

1. Sitting balance: Leans or slides in chair =0

Steady, safe =1_____

2. Arises: Unable without help =0

Able, uses arms to help =1

Able without using arms =2_____

3. Attempts to arise: Unable without help =0

Able, requires > 1 attempt =1

Able to arise, 1 attempt =2_____

4. Immediate standing balance (first five seconds):

Unsteady (swaggers, moves feet, trunk sway =0

Steady but uses walker or other support =1

Steady without walker or other support =2_____

5. Standing balance Unsteady =0

Steady but wide stance (medial heels >4 in.

apart) and uses cane or other support =1

Narrow stance without support =2_____

6. Nudged (subject at maximum position with feet as close

together as possible, examiner pushes lightly on

subject's sternum with palm of hand 3 times):

Begins to fall =0

Staggers, grabs, catches self =1

Steady =2_____

7. Eyes Closed (at maximum position No. 6)

Unsteady =0

Steady =1_____

8. Turning 360 degrees Discontinuous Steps =0

Continuous =1

Unsteady (grabs, staggers) =0

Steady =1_____

9. Sitting down Unsafe (misjudges distance, falls into chair) =0

Uses arms or not a smooth motion =1

Safe, smooth motion =2_____

Balance Score: _____/16

Source: The Journal of the American Geriatric Society by Carole Lewis Ph.D, PT

Tinetti Assessment Tool: Gait

Patient: _____ Date: _____

Location: _____ Rater: _____

Initial instructions: Subject stands with examiner, walks down hallway or across room, first at “usual” pace, then back at “rapid, but safe” pace

(using usual walking aids).

Task Description of Gait Score

10. Initiation of gait (immediately after told to “go”)

Any hesitancy or multiple attempts to start = 0

No hesitancy = 1 _____

11. Step length and height

a. Right swing foot: does not pass left stance foot with step = 0

passes left stance foot = 1

right foot does not clear floor completely with step = 0

right foot completely clears floor = 1

b. Left swing foot: does not pass right stance foot with step = 0

passes right stance foot = 1

left foot does not clear floor completely with step = 0

left foot completely clears floor = 1 _____

12. Step Symmetry

Right and left step length not equal (estimate) = 0

Right and left step appear equal = 1 _____

13. Step Continuity

Stopping or discontinuity between steps = 0

Steps appear continuous =1_____

14. Path (estimated in relation to floor tiles, 12-inch diameter;
observe excursion of 1 foot over about 10 ft. of
the course.)

Marked deviation =0

Mild/moderate deviator or uses walking aid =1

Straight without walking aid =2_____

15. Trunk Marked sway or uses walking aid =0

No sway but flexion of knees or back or spreads
arms out while walking =1

No sway, no flexion, no use of arms, and not use
of walking aid =2_____

16. Walking Time Heels apart =0

Heels almost touching while walking =1_____

Gait Score: /12

Balance + Gait Score: /28