

ARENA-JPA, ISSN 2285-830X

12, pp. 8-17, 2023, 10.62951/ajpa.2024/12/01

"Impact of walking and the OTAGO exercise program on improving balance parameters in the elderly". (Research Methodology).

Robert Çitozi¹, Klajdi Xhebexhiu²

^{1,2} Sports University of Tirana. Faculty of Physical Activity and Recreation.

Corresponding: Robert Çitozi (e-mail: rcitozi@ust.edu.al rcitozi@yahoo.com).

Abstract

There will likely be a rise in fall rates as the population ages. This will impact our society and put more strain on healthcare systems by increasing the number of unintentional injuries and injury-related deaths. According to Zijlstra et al. (2007), falls have a significant psychological impact on individuals, frequently leading to diminished confidence, decreased functional activity, deconditioning, and an elevated risk of falls. Estimated costs of fall-related damage to older adults owing to demographic changes in Australia (2003) predict that by 2051, fall-related injuries, which currently account for 5% of the country's overall health budget, would triple and cost the Australian health system about \$1,375 million annually. Exercise and other modifications in lifestyle can potentially reduce the risk of many physical falls (Gregg et al., 2000; Sherrington et al., 2011). The current recommendations for physical exercise among older persons, which include elements of aerobic, resistance, and balance training, are not met by many of them. According to Chodzko-Zajko et al. (2009), the American College of Sports Medicine (ACSM) advises older persons to engage in aerobic, muscle-strengthening, and flexibility exercises. People who have mobility issues or are at risk of falling should also engage in certain activities designed to enhance their balance. We determined that the study's subjects would be third-age individuals (over 65) who reside in assisted living facilities located in Tirana's district and city due to the issues that this demographic faces.

Keywords: falls prevention, ageing, nursing home support services, quality of life, older people, walking, OTAGO exercise program, balance, preventive care.

Introduction

Based on official data from the Social Security Administration and the State Social Service, as well as information from the media, it appears that quote Journal Si, July 29, 2022— "Every year, between 150 and 200 requests are made for accommodations in senior citizen homes." There are 350 spots available in total for senior homes across the nation. According to Journal Shqiptarja.com (12.09.2023), "76,413 people over 80 were estimated to reside in Albania by INSTAT in January 2019." "In Albania, there are six state homes for the elderly in Tirana, Kavaja, Gjirokastër, Shkodër, Fier, and Poliçan," the Social Security Administration website states as well". Given that the number of senior citizens housed in state-run nursing homes or institutions is limited to 350, we will use a program to randomly select 48 subjects from among the 350 names. We wish to stress that this study has its own challenges in persuading and heavily involving this demographic category in the experimental research because of health issues, a lack of culture surrounding physical exercise, skepticism regarding their participation in the study, etc. We estimate that 48 people in all will be involved in this study, split into the following groups, with measurements being taken both before and after the experiment for each group:

- Experimental Group with 24 subjects,
- Control Group with 24 subjects.

Subjects in total: 48.

According to Cumming et al. (2000), falls are one of the most prevalent age-related health issues affecting older people. They also frequently result in hospitalization for injuries, a loss of independence, and a lower quality of life. Exercise alone has been shown to help address the physiological deficits that are part of the complex etiology of falls and can reduce the rate of falls by about 30%. Exercises that challenge balance in particular have been shown to be especially effective in this regard (Sherrington et al., 2008; Sherrington et al., 2011b; Gillespie et al., 2012).

- a. Walking is an inexpensive, low-impact type of physical activity. It has a vital function in the prevention and treatment of many diseases in addition to enhancing general health and quality of life (Stewart et al., 2017). Since it doesn't call for any specialized knowledge or equipment, walking is a fundamental activity that anyone can perform (Morris & Hardman, 1997). In order to achieve the same health advantages as 30 minutes of moderate-to-intense physical exercise, older people should walk between 7,000 and 10,000 steps per day, according to a review by Tudor-Locke et al. (2011). Another recommendation is that older persons engage in 30 minutes or 3000 steps of

- moderate-intensity walking each day (Marshall et al., 2009). Walking improves fall-related psychological issues as well as balancing components (Okubo et al., 2014). Over a 16-month application period, the authors found that walking at a self-selected pace for 30 minutes, 2-3 times per week, decreased the risk of falls in older persons (Okubo et al., 2015).
- b. Dancing has the ability to enhance a wide range of physical and cognitive fall risk factors since it is a sophisticated sensorimotor rhythmic exercise that integrates various physical, cognitive, and social elements. Dancing is more of an enjoyable social exercise for a lot of individuals than many basic, monotonous strength and balance routines that are frequently done alone. Research on the remarkable balancing abilities of young professional dancers has led to the suggestion that dancing might be a useful fall prevention technique (Judge, 2003). Ever since, a number of research studies that focused on dance and involved senior citizens have been published (Keogh et al., 2009), providing evidence for the positive effects of dance on gait and balance, two of the biggest risk factors for falls in the elderly (Ganz et al., 2007). According to Verghese (2006) and Jian-Guo et al. (2008), cross-sectional research has demonstrated that older adults who dance exhibit better gait and balance features than age-matched controls.
 - c. According to Campbell et al. (1997), the OTAGO fitness program is a progressive, well-structured, personally designed workout regimen that may be completed at home. Numerous studies in various nations and contexts have assessed OEP (Benavent-Caballer et al., 2016; Shubert et al., 2016; H. N. Yoo et al., 2013). Men and women over 70 were randomly assigned to experimental and control groups in a prior study on the Otago fitness program. It was found that the OTAGO exercises enhanced balance, increased muscle strength, and decreased the risk of falls (Liu-Ambrose et al., 2008). When it comes to keeping older adults from falling, one of the most well-liked exercise regimens is the OTAGO Exercise Program (OEP). It is typically created as a home workout regimen that includes walking, balance training, and exercises for strengthening muscles (Campbell et al., 2005). In order to prevent falls in older adults, the University of OTAGO in New Zealand created the OTAGO Exercise Program (OEP), a customized resistance and balance exercise program (Campbell & Robertson, 2006; Zalewski, 2015; Society et al., 2001; Patel et al., 2008; Robertson et al., 2002). It includes six warm-up exercises, five exercises for strengthening the muscles in the lower extremities, twelve activities for balancing that get harder and harder with time, and two exercises for recovery (Sherrington et al., 2011b; Robertson, 2001).

d.

Material and methods

The study will be based on preliminary laboratory tests that will determine the experimental groups' and the control group's levels of static and dynamic balance. The study will involve individuals who are 65 years of age or older, receive housing and assistance from public and private nursing homes in Tirana, are able to walk with or without assistance, have experienced at least one fall in the previous 12 months, and have successfully completed both the international standardized questionnaire (eq-5d) and a minimalist mental state test. The premise of the intervention is that:

- a. For a duration of 12 weeks, the experimental group will receive treatment using an OTAGO exercise program three times a week and walking with varying volumes, intensities, and respite along with dance elements once a week.
- b. The control group will carry on with its own daily schedule and plans, independent of the outcomes of the two experimental groups.

In weeks 1-4, the elderly will walk with experimental group 1 at a moderate intensity, walking 3000 steps per day or 30 minutes per day, three times per week.

- The elderly will walk with experimental group 1 at a moderate intensity for three times a week, or 4500 steps per day, or 45 minutes per day, in weeks 5-8.

- The elderly will practice walking with experimental group 1 in weeks 9–12, increasing the intensity to 6000 steps per day or 60 minutes per day, three times per week.

- Three times a week, participants should attempt to walk for 30 to 60 minutes at their regular pace. If you find the elderly to be fatigued, you can divide the stroll into shorter parts, such as three 10-minute periods. Elderly people with serious health issues should ideally be accompanied for the duration of the hiking program.

- For a period of 12 weeks straight (a total of 13 sessions), experimental group 1 will participate in weekend Latin/waltz dance classes lasting 45 to 60 minutes. Dance is less about physical goals and more about group social therapy and relaxation exercises.

Recommendations for carrying out the OEP:

Show, explain, and keep a careful eye on the person completing the activities to make sure they:

- Start with five minutes of mild stretching and warm-up.
- Every senior's exercise regimen is customized accordingly.
- The senior is content to carry on working out on her own between visits.

Strength training: The initial level is based on the person's ability to use the ankle cuff weight. Before becoming fatigued, complete 8 to 10 quality repetitions. This needs to be evaluated for every leg's muscle group. Individuals who are 80 years of age or older typically begin with 1 to 2 kilograms. Users may use up to 8 kg.

• Take note: Starting carefully and gradually will reduce the likelihood of both muscular discomfort and noncompliance issues. During strength training, we ensure that:

- The individual utilizes reasonably priced ankle cuff weights.
- The replacement of other muscle groups is modest.
- The individual breathes correctly—before a lift, exhale deeply, and then inhale as the elevator descends.
- The exercises are done slowly by the person using the joints' active functional range of motion (two to three seconds for lifting, four to five seconds for lowering). Between sets, the participant takes one to two minutes to rest.

• All strength exercises are performed standing, with the exception of the "front knee strengthening" exercise, which is performed while seated. (This helps enhance balance and strength.)

• The exercises are somewhat intense; the participant shouldn't overexert himself or go beyond their comfort zone.

Exercises for retraining balance:

- Watch the person perform the balance exercise to make sure they can use lower body techniques to recover their equilibrium.
- Not everyone will finish all of the balancing exercises or begin at level one.

People who are unstable could first require a larger support system. When doing balance exercises, make sure the person can:

- look forward;
- understand that it's beneficial to change lower limb balance throughout exercises, such as the recovery step.

There are many benefits associated with the OTAGO fitness program. By following your program, you can enhance your overall fitness, muscle strength, balance, and general well-being. The workouts listed should be done three times a week. You can divide up the exercises. They don't have to wrap up right away. After every round of exercise, inhale deeply three times or more. Upon beginning an exercise regimen, you could experience some stiffness. This is really typical. As a result, you may be using muscles that are not accustomed to the activity. It

is crucial that you, keep up your training. As your body adjusts to the workout, it will become less stiff (J. C. Davis et al., 2010).

Security

Never try grasping onto a chair or other moving object. Use the side of a solid item, like a bench or table, unless instructed differently. If an illness keeps you from continuing with the fitness program, get in touch with your teacher before beginning it again. Please do not hesitate to call your instructor if you have any of the following symptoms during exercise: dizziness, chest pain, or difficulty speaking due to shortness of breath (J. C. Davis et al., 2010).

Daily

You may become more physically fit by increasing your daily activity, as you may not be aware. Here are a few suggestions for things to do during the day: Use the stairs rather than the escalator or elevator. Walk home after getting off the bus one stop early. Take a walk with relatives and guests when they arrive before enjoying a cup of tea. When the weather permits, use the garden. As you fold clothes, get up. These are but a few instances of time- and money-saving techniques (J. C. Davis et al., 2010).

Walking

Walking is a fantastic way to increase your level of general fitness. You should think about taking a walk on the days in between your workouts. Walk for longer periods of time and farther each time. stroll outside and enjoy the pleasant weather (J. C. Davis et al., 2010).

Advice For Those Who Walk.

- Don't forget to dress comfortably.
- Begin with two minutes of stationary walking as part of your warm-up.

As You Move...

- The shoulders are loose, and the arms swing gently.
- Aim upward rather than below.
- With every step, push with your toes behind the heel.
- Conclude with two minutes of stationary jogging.

Take pleasure in your work!

The tests will take place in the Biomechanics Laboratory of Sports University of Tirana.

1. CRT: Chair Rising Test / Test for rising from the chair
2. Romberg Test
3. Semi-tandem stance balance exercise

Discussions & Conclusions

In order to maximize performance gains, the literature review, meta-analysis, and study design seek to identify the quantitative correlations between balance training modalities (i.e., training length, training frequency, and training volume), equilibrium in healthy adults 65 years of age and older, primarily among residents of or guests in assisted living facilities (public or private). To the best of our knowledge, this study and the balance training regimens it uses to improve performance and balance in healthy older persons 65 years of age and older are, as far as we know, the first of their kind to be developed at the PhD level in our nation.

We believe the 12-week training period, three weekly sessions, 36 training sessions total, each lasting 30 to 60 minutes, and a weekly total of 90 to 120 minutes of OTAGO exercise program (without walking time) combined with 12 dance sessions (one every weekend) will be well received by the nursing home community, boosting their confidence that everything in this study is for improving their quality of life, which will culminate in a 30 to 40% improvement in their balance, thereby reducing the number of falls. Falls are one of the most sensitive issues for this relatively vulnerable age group and are often left untreated by peers, family, and policymakers.

In order to increase the effectiveness of practitioners' and therapists' protocols for improving balance, our study will offer new scientific evidence and guidance on load-dosing relationships. It will also emphasize the need for studies that combine balance training with programs that are methodically structured. The anticipated notable enhancement of balance from 30–40% would represent a noteworthy accomplishment for Albanian physical activity in the health field. This, in turn, would improve the elderly population's quality of life while also significantly lowering the national health system's expenses who mostly in the last ten years, has come to view falls and the consequences they produce as an emergency.

References

- Benavent-Caballer, V., Rosado-Calatayud, P., Segura-Ortí, E., Amer-Cuenca, J., & Lisón, J. (2016). The effectiveness of a video-supported group-based Otago exercise programme on physical performance in community-dwelling older adults: a preliminary study. *Physiotherapy*, 102(3), 280–286. <https://doi.org/10.1016/j.physio.2015.08.002>
- Campbell, A. J., Robertson, M. C., Gardner, M. M., Norton, R. N., Tilyard, M. W., & Buchner, D. M. (1997). Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. *BMJ*, 315(7115), 1065–1069. <https://doi.org/10.1136/bmj.315.7115.1065>
- Campbell, A. J., Robertson, M. M., La Grow, S., Kerse, N., Sanderson, G., Jacobs, R. A., Sharp, D., & Hale, L. (2005). Randomised controlled trial of prevention of falls in people aged ≥ 75 with severe visual impairment: the VIP trial. *BMJ*, 331(7520), 817. <https://doi.org/10.1136/bmj.38601.447731.55>
- Chodzko-Zajko, W., Proctor, D. N., Singh, M. a. F., Minson, C. T., Nigg, C. R., Salem, G. J., & Skinner, J. S. (2009). Exercise and physical activity for older adults. *Medicine and Science in Sports and Exercise*, 41(7), 1510–1530. <https://doi.org/10.1249/mss.0b013e3181a0c95c>
- Cumming, R. G., Salkeld, G., Thomas, M. H., & Szonyi, G. (2000). Prospective study of the impact of fear of falling on activities of daily living, SF-36 scores, and nursing home admission. *The Journals of Gerontology*, 55(5), M299–M305. <https://doi.org/10.1093/gerona/55.5.m299>
- Davis, J. C., Robertson, M. C., Ashe, M. C., Liu-Ambrose, T., Khan, K. M., & Marra, C. A. (2010). Does a home-based strength and balance programme in people aged ≥ 80 years provide the best value for money to prevent falls? A systematic review of economic evaluations of falls prevention interventions. *British Journal of Sports Medicine*, 44(2), 80–89. <https://doi.org/10.1136/bjism.2008.060988>
- Ganz, D. A., Bao, Y., Shekelle, P. G., & Rubenstein, L. Z. (2007). Will my patient fall? *JAMA*, 297(1), 77. <https://doi.org/10.1001/jama.297.1.77>
- Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L., & Lamb, S. E. (2012). Interventions for preventing falls in older people living in the community. *The Cochrane Library*, 2021(6). <https://doi.org/10.1002/14651858.cd007146.pub3>
- Gregg, E. W., Pereira, M. A., & Caspersen, C. J. (2000). Physical activity, falls, and fractures among Older adults: A review of the Epidemiologic evidence. *Journal of the American*

- Geriatrics Society, 48(8), 883–893. <https://doi.org/10.1111/j.1532-5415.2000.tb06884.x>
- Jian-Guo, Z., Ishikawa-Takata, K., Yamazaki, H., Morita, T., & Ohta, T. (2008). Postural stability and physical performance in social dancers. *Gait & Posture*, 27(4), 697–701. <https://doi.org/10.1016/j.gaitpost.2007.09.004>
- Judge, J. O. (2003). Balance training to maintain mobility and prevent disability. *American Journal of Preventive Medicine*, 25(3), 150–156. [https://doi.org/10.1016/s0749-3797\(03\)00178-8](https://doi.org/10.1016/s0749-3797(03)00178-8)
- Keogh, J. W. L., Kilding, A. E., Pidgeon, P., Ashley, L., & Gillis, D. (2009). Physical benefits of dancing for healthy Older Adults: a review. *Journal of Aging and Physical Activity*, 17(4), 479–500. <https://doi.org/10.1123/japa.17.4.479>
- Marshall, S. J., Levy, S. S., Tudor-Locke, C. E., Kolkhorst, F. W., Wooten, K. M., Ji, M., Macera, C. A., & Ainsworth, B. E. (2009). Translating Physical Activity Recommendations into a Pedometer-Based Step Goal. *American Journal of Preventive Medicine*, 36(5), 410–415. <https://doi.org/10.1016/j.amepre.2009.01.021>
- Morris, J. N., & Hardman, A. E. (1997). Walking to Health. *Sports Medicine*, 23(5), 306–332. <https://doi.org/10.2165/00007256-199723050-00004>
- Okubo, Y., Osuka, Y., Jung, S., Figueroa, R., Tsujimoto, T., Aiba, T., Kim, T., & Tanaka, K. (2014). Effects of walking on physical and psychological fall-related factors in community-dwelling older adults: Walking versus balance program. *The Journal of Physical Fitness and Sports Medicine*, 3(5), 515–524. <https://doi.org/10.7600/jpfsm.3.515>
- Okubo, Y., Osuka, Y., Jung, S., Rafael, F., Tsujimoto, T., Aiba, T., Kim, T., & Tanaka, K. (2015). Walking can be more effective than balance training in fall prevention among community-dwelling older adults. *Geriatrics & Gerontology International*, 16(1), 118–125. <https://doi.org/10.1111/ggi.12444>
- Patel, M., Magnusson, M., Kristinsdottir, E., & Fransson, P. A. (2008). The contribution of mechanoreceptive sensation on stability and adaptation in the young and elderly. *European Journal of Applied Physiology*, 105(2), 167–173. <https://doi.org/10.1007/s00421-008-0886-4>
- Projected costs of fall related injury to older persons due to demographic changes in Australia. (2003).
- Robertson, M. C., Campbell, A. J., Gardner, M. M., & Devlin, N. (2002). Preventing Injuries in Older People by Preventing Falls: A Meta-Analysis of Individual-Level Data. *Journal*

- of the American Geriatrics Society, 50(5), 905–911. <https://doi.org/10.1046/j.1532-5415.2002.50218.x>
- Robertson, M. M., Devlin, N., Gardner, M. M., & Campbell, A. J. (2001). Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial. *BMJ*, 322(7288), 697. <https://doi.org/10.1136/bmj.322.7288.697>
- Sherrington, C., Tiedemann, A., Fairhall, N., Close, J. C., & Lord, S. R. (2011). Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *NSW Public Health Bulletin*, 22(4), 78. <https://doi.org/10.1071/nb10056>
- Shubert, T. E., Smith, M. L., Jiang, L., & Ory, M. G. (2016). Disseminating the Otago Exercise Program in the United States: Perceived and Actual Physical Performance Improvements From Participants. *Journal of Applied Gerontology*, 37(1), 79–98. <https://doi.org/10.1177/0733464816675422>
- Society, A. G., Society, G., Of, A. A., & On Falls Prevention, O. S. P. (2001). Guideline for the Prevention of Falls in Older Persons. *Journal of the American Geriatrics Society*, 49(5), 664–672. <https://doi.org/10.1046/j.1532-5415.2001.49115.x>
- Tudor-Locke, C., Craig, C. L., Brown, W. J., Clemes, S. A., De Cocker, K., Giles-Corti, B., Hatano, Y., Inoue, S., Matsudo, S. M., Mutrie, N., Oppert, J. M., Rowe, D. A., Schmidt, M. D., Schofield, G. M., Spence, J. C., Teixeira, P. J., Tully, M. A., & Blair, S. N. (2011). How many steps/day are enough? for adults. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 79. <https://doi.org/10.1186/1479-5868-8-79>
- Vergheze, J. (2006). Cognitive and mobility profile of older social dancers. *Journal of the American Geriatrics Society*, 54(8), 1241–1244. <https://doi.org/10.1111/j.1532-5415.2006.00808.x>
- Yoo, H., Chung, E., & Lee, B. (2013). The effects of augmented reality-based Otago exercise on balance, GAIT, and falls efficacy of elderly women. *Journal of Physical Therapy Science*, 25(7), 797–801. <https://doi.org/10.1589/jpts.25.797>
- Zalewski, C. (2015). Aging of the Human Vestibular System. *Seminars in Hearing*, 36(03), 175–196. <https://doi.org/10.1055/s-0035-1555120>
- Zijlstra, G. a. R., Van Haastregt, J. C. M., Van Eijk, J., Van Rossum, E., Stalenhoef, P. A., & Kempen, G. I. J. M. (2007). Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. *Age And Ageing*, 36(3), 304–309. <https://doi.org/10.1093/ageing/afm021>