International Journal of Nursing Studies 56 (2016) 1–8

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

An evaluation of a nurse-led rehabilitation programme (the ProBalance Programme) to improve balance and reduce fall risk of community-dwelling older people: A randomised controlled trial

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ARTICLE INFO

Article history:
Received 14 October 2014
Received in revised form 8 December 2015
Accepted 11 December 2015

Keywords:
Aged
Community-dwelling
Rehabilitation nursing
Postural balance

ABSTRACT

Objective: This study aims to assess the effect of a nurse-led rehabilitation programme (the ProBalance Programme) on balance and fall risk of community-dwelling older people from Madeira Island, Portugal.
Design: Single-blind, randomised controlled trial.
Setting: University laboratory.
Participants: Community-dwelling older people, aged 65–85, with balance impairments. Participants were randomly allocated to an intervention group (IG; $n = 27$) or a wait-list control group (CG; $n = 25$).
Intervention: A rehabilitation nursing programme included gait, balance, functional training, strengthening, flexibility, and 3D training. One trained rehabilitation nurse administered the group-based intervention over a period of 12 weeks (90 min sessions, 2 days per week). A wait-list control group was instructed to maintain their usual activities during the same time period.
Outcome: Balance was assessed using the Fullerton Advanced Balance (FAB) scale. The time points for assessment were at zero (pre-test), 12 (post-test), and 24 weeks (follow up).
Results: Changes in the mean (SD) FAB scale scores immediately following the 12-week intervention were 5.15 (2.81) for the IG and −1.45 (2.80) for the CG. At follow-up, the mean (SD) change scores were −1.88 (1.84) and 0.75 (2.99) for the IG and CG, respectively. The results of a mixed between-within subjects analysis of variance, controlling for physical activity levels at baseline, revealed a significant interaction between group and time ($F(2, 42) = 27.89$, $p < 0.001$, Partial Eta Squared = 0.57) and a main effect for time ($F(2, 43) = 3.76$, $p = 0.03$, Partial Eta Squared = 0.15), with both groups showing changes in the mean FAB scale scores across the three time periods. A significant main effect comparing

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http://dx.doi.org/10.1016/j.ijnurstu.2015.12.004

the two groups (F (1, 43) = 21.90, $p < 0.001$, Partial Eta Squared = 0.34) confirmed a clear positive effect of the intervention when compared to the control.
Conclusion: This study demonstrated that the rehabilitation nursing programme was effective in improving balance and reducing fall risk in a group of older people with balance impairment, immediately after the intervention. A decline in balance was observed for the IG after a period of no intervention.
Clinical Trial Registration Number: ACTRN12612000301864.

What is already known about the topic?

- Research has shown that some types of exercise are moderately effective in improving clinical balance of older adults, immediately following an intervention.
- Conflicting evidence still exists as to the type of exercise and conditions under which interventions are effective.

What this paper adds

- This original research article describes a positive effect of a rehabilitation nursing intervention in improving the multiple dimensions of balance in older adults with balance impairments.

1. Background

One of the strongest modifiable risk factors associated with increased fall risk is balance impairment (Deandrea et al., 2010; Rubenstein and Josephson, 2002; Tinetti and Kumar, 2010). Impaired balance is also an important independent predictor of the transition in status from non-faller to faller (Muir et al., 2010). Because of this association between balance impairments and increased risk of falling in older people, the effect of exercise interventions on balance, and specifically the effect of community-based group-structured exercise programmes, have been extensively studied over the past 20–25 years (Rose, 2008). Currently, there is scientific evidence that some types of exercise, including gait, balance, co-ordination and functional tasks, strengthening exercise, 3D exercise and multiple exercise types, are moderately effective in improving clinical balance outcomes (Cadore et al., 2013; Howe et al., 2011). In particular, theory-driven rehabilitation programmes targeting important intrinsic risk factors associated with increased fall risk, such as balance and gait impairments and muscle weakness, have proven to be effective in reducing fall risk and improving balance among older people (Rose, 2011; Westlake and Culham, 2007).

However, there are still uncertainties related to specific characteristics of the participants targeted (i.e., balance levels at baseline), and the type, the dosage, the settings and the supervision needed during the intervention (Howe et al., 2011). Therefore, further research is needed on this topic.

From a rehabilitation nursing perspective, early identification of age-related changes and risk factors for falls, such as balance impairments, and the delivery of targeted training are essential to prevent older adults from progressing to more severe impairments or experiencing a serious fall. Therefore, the present research aims to provide evidence on the effect of a theory-driven group-based exercise intervention (the ProBalance Programme) in a group of community-dwelling older people with balance impairments from Madeira Island, Portugal.

2. Methods

2.1. Study design

A randomised controlled trial (RCT) was conducted to assess the effect of the ProBalance Programme on balance of community-dwelling older people with balance impairment from Madeira Island, Portugal. This RCT was prospectively registered in the Australian New Zealand Clinical Trials Registry Platform and the clinical trial registration number was ACTRN12612000301864.

2.2. Participants

The sample consisted of 177 community-dwelling men and women aged 65–85 years old. Participants were recruited from Madeira Island, Portugal, by advertising in a regional newspaper, posters, flyers with written information, social networks, and through presentations by the main researcher in religious communities and social institutions in the city.

For participation, all volunteers were assessed for eligibility criteria in the project's laboratory in the University, by a trained group of assessors (six Registered Nurses and an expert in the field of Gerokinesiology, who coordinated the group). Key inclusion criteria were: (1) to be community-dwelling and aged 65–85 years; (2) to present balance impairments compatible with scoring 26 to 30/40 in the Fullerton Advanced Balance (FAB) scale or scoring 20 to 25/40 in the FAB scale, if not reporting falls in the past year; and (3) to be able to walk independently. Exclusion criteria included: (1) cognitive impairment (assessed by the Mini Mental State Test), and (2) any significant co-morbidities that would preclude participation, such as acute illnesses, progressive neurological diseases, stroke, and other unstable chronic conditions.

The optimal sample size calculation was based on results of previous research and the results of an earlier pilot study (4-week duration Mini-RCT), using G*Power3 (Faul et al., 2007). A priori, repeated-measures ANOVA indicated that a total sample size of 48 was needed to achieve 95% power to detect an interaction effect size of