



Original Research

The Effect of Yoga on Balance and Fear of Falling in Older Adults

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Abstract

Objective: To determine the effect of yoga on balance and fear of falling in older adults.

Design: Randomized controlled trial.

Setting: Jahandidegan Center in Shiraz, southern Iran.

Participants: Forty persons (17 men and 23 women) between the ages of 60-74 years with a Modified Falls Efficacy Scale (MFES) score <8 and a Berg Balance Scale (BBS) score <45. After completing the MFES questionnaire and BBS measurement, the participants were divided into intervention and control groups. BBS measurement and the MFES questionnaire were completed again immediately after the intervention.

Intervention: The intervention group participated in 2 yoga practice sessions per week for 8 weeks. The control group received no intervention.

Main Outcome Measurements: Fear of falling was measured with the MFES and balance was measured with the BBS.

Results: We found significant changes in both variables ($P < .0001$). Mean differences before and after the intervention for the BBS for yoga and control groups were 10.19 and -1.16 , respectively. Mean differences before and after the intervention for the MFES for yoga and control groups were 1.62 and -0.21 , respectively.

Conclusion: Yoga is a potential intervention to reduce fear of falling and improve balance in older adults.

Introduction

One third of people aged 65 years and older fall each year [1]. Falls are a major cause of serious injuries in older adults, leading to hospitalization, nursing home admission, and even death [2]. The number of falls and severity of injury increase with age [3]. The Centers for Disease Control and Prevention (CDC) estimates that the costs of fall-related injuries are expected to reach \$54.9 billion by 2020 in the United States [4]. Balance deficits are one of the fall risk factors in community-dwelling older adults [5]. Belgen et al [6] assessed 50 people with chronic effects of stroke and reported that subjects with a history of multiple falls had poorer balance and more fear of falling (FOF) than persons who did not fall and first-time fallers. Thus, with respect to the American Geriatrics Society guideline, balance deficits should be evaluated in older adults reporting a fall [7]. Adequate balance control is required to perform mobility-related activities such as standing while doing manual tasks, rising from a chair, and walking safely

during daily life. One third to one half of the population older than 65 years experience difficulty with their balance or ambulation [8]. In older adults, falling is a multidimensional problem. Therefore, a person's risk of falling cannot be assessed only by physical risk factors; other important aspects such as FOF must be considered [9].

FOF exists among 30% of older adults who have never experienced falling, and the rate is double in older adults who have experienced at least one fall [10]. FOF is linked to reduced participation in daily activities, lower quality of life, increased risk of institutionalization, depression, decreased social activity, and physical weakness [11]. Falls and FOF are interrelated problems, with each being a risk factor for the other [12,13].

Falls can be prevented [14,15]. A previous study showed that exercise can improve physical abilities in frail adults [16]. Barnett et al [17] showed that participation in weekly group exercises along with exercise at home improves balance and decreases the rate of falling among older adults. Yoga is a popular mind and body

practice that concentrates on meditation, breathing, and postures [18]. The control of posture practice in yoga involves stretch and balance while maintaining a stable sitting or standing position [19]. Yoga may also have psychosocial benefits through prevention and control of common health and emotional problems linked with aging [16]. A recent evidence-based study showed the effectiveness of yoga for psychosocial and physical functioning in older adults [9]. Yoga also can improve gait speed [20] and awareness and self-esteem [21]. Therefore, it is possible to improve balance and FOF, 2 known fall risk factors, in older adults through yoga exercise. Yoga is simple to learn and can be practiced by older adults, even those who are ill or disabled. A growing body of research suggests that yoga-based interventions are readily accepted by older adults and may improve health in this population [22].

Schmid et al [23] evaluated the effect of a 12-week yoga intervention on FOF and balance in older adults and found that yoga decreased FOF by 6% and increased static balance by 4%. In this study, the change in FOF was a positive trend, although not significant. Compared with the study by Schmid et al [23], our study has a larger sample size, includes people with low Berg Balance Scale (BBS) and Modified Falls Efficacy Scale (MFES) scores, and involves both intervention (yoga) and control groups, which closely match in terms of starting MFES and BBS scores, gender, and age.

The purpose of this study was to examine the effect of yoga on balance and FOF in older adults with low BBS and MFES scores. The hypothesis for this study was that the participants undergoing the yoga intervention would show significant improvement in balance and FOF.

Methods

A preliminary pilot study was carried out to determine the validity and reliability of the MFES [24] for Iranian older adults. The original questionnaire was translated into Persian by 3 professors of the Nursing and Midwifery School of Shiraz University of Medical Sciences, Shiraz, southern Iran. The preliminary Persian version was translated back into English by another translator. To ensure that the questionnaire was clear, the researcher discussed it with 2 older adults separately. Then, as approved by the Shiraz Welfare Organization, 30 people aged 60-74 years who were willing to participate in the pilot study were chosen from Shiraz Jahandidegan Center to complete the questionnaire twice within a time span of 3 weeks. Cronbach's α and test-retest reliability were then calculated.

Subjects

All participants were older adults who visited the Jahandidegan Center in Shiraz, Iran. This Center provides activities and classes for elderly persons.

Recruitment began in March 2011 and ended in June 2011. The researcher took part in the center's entertainment classes and introduced the research program, asking for willing participants. Inclusion criteria were being 60-74 years of age, having an MFES score <8 [25] and a BBS score <45 , and being willing to participate in the study. Of the 120 older adults who were considered, 40 met the inclusion criteria. We excluded persons who had cognitive or neuromuscular diseases, advanced osteoporosis, or dizziness. We also excluded persons who were taking anticonvulsant, narcoleptic, or sedative drugs, used walking aids, attended yoga classes outside the research study, or experienced acute pain that prevented them from doing the exercises.

The 40 participants were asked to sign a consent form. They were then randomly assigned to either the intervention (yoga) or control group, using the block randomization method size 4. The block randomization was used only on the basis of 2 groups (yoga and control). The participant flow diagram is shown in Figure 1.

The sample size was calculated using the Power Analysis and Sample Size (PASS) program (NCSS, Kaysville, UT). The sample size was calculated as 16 in each group based on the following variables: mean difference = 15, standard deviation (SD) 1 = 15.4, SD 2 = 14.5, $\alpha = 0.05$, and power = 80% [26]. Anticipating an attrition rate of 20%, we chose to include 20 persons in each group. This study was approved by the Ethics Committee of the Shiraz University of Medical Sciences.

Measures

The participants were asked to complete the MFES and demographic data questionnaires. The MFES, a 14-item activity questionnaire, is an expanded version of the original 10-item activity Falls Efficacy Scale [24]. The MFES includes outdoor activities not covered by the Falls Efficacy Scale. Each item is scored on a 10-point visual analogue scale; 0 = not confident/not sure at all, 5 = fairly confident/fairly sure, and 10 = completely confident/completely sure. The MFES score range for each individual is 0-10, with 10 being a perfect score. To obtain each subject's MFES score, the ratings (possible range = 0-140) are totaled and divided by 14. Scores <8 indicate fear of falling, and scores ≥ 8 indicate lack of fear [25]. The MFES has excellent reliability (intraclass correlation coefficients [ICC] = 0.93) and internal consistency (0.95) [25]. In our pilot study, Cronbach's α coefficient for the MFES questionnaire was 0.92, and the performed test-retest had appropriate reliability ($r = 0.99$).

A research assistant measured the postural balance of each participant using the BBS. The BBS is a 14-item scale designed to measure balance in older adults. Each item is scored on a 5-point scale from 0-4 (0 indicates the lowest level of function and 4 the highest level of function), with 56 being the highest total score.

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