Archives of Gerontology and Geriatrics 66 (2016) 147–153

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

Fear of falling as a risk factor of mobility disability in older people at five diverse sites of the IMIAS study

Mohammad Auais[a], Beatriz E. Alvarado[b], Carmen-Lucia Curcio[c], Angeles Garcia[d], Alban Ylli[e], Nandini Deshpande[a,*]

[a] School of Rehabilitation Therapy, Queen's University, Kingston, Canada
[b] Department of Public Health Sciences, Queen's University, Kingston, Canada
[c] Research Group on Geriatrics and Gerontology, Faculty of Health Sciences, University of Caldas, Manizales, Colombia
[d] Division of Geriatric Medicine, Queen's University, Kingston, Canada
[e] Albanian National Institute of Health, Tirana, Albania

ARTICLE INFO

Article history:
Received 2 December 2015
Received in revised form 29 April 2016
Accepted 29 May 2016
Available online 4 June 2016

Keywords:
Fear of falling
Mobility disability
Site-related differences

ABSTRACT

Background: Fear of falling (FoF) is a common health problem among older adults. Although the relationship between FoF and limitation in daily activities has been reported, FoF's relationship to mobility disability, a transitional phase to end-stage disability, is not yet understood. We examined the relationship between FoF and mobility disability among community-dwelling older adults and explored the differences in this relationship among socio-culturally diverse sites.
Design: Cross-sectional study.
Setting: Community.
Participants: 1875 participants (65–74 years) were recruited from five sites and included in the analysis (Kingston, Canada: 394; St-Hyacinthe, Canada: 397; Tirana, Albania: 359; Manizales, Colombia: 341; and Natal, Brazil: 384).
Measurement: FoF was quantified using the Falls Efficacy Scale-International (FES-I, range: 16–64). Mobility disability was defined as difficulty climbing a flight of stairs or walking 400 m without assistance.
Results: Overall, 21.5% of participants reported high FoF (FES-I > 27). The average FoF scores were significantly different between the sites ($p < 0.001$) and higher in women ($p < 0.001$). In general, 36.2% of participants reported mobility disability. The distribution of mobility disability was significantly different at the five study sites (ranged from 19.8% at Kingston, Canada to 50.7% at Tirana, Albania, $p < 0.001$). After adjusting for covariates, those with high and moderate FoF had about 3 times (95% CI: 2.59–3.83) and 2.5 times (95% CI: 1.99–2.91) higher risk of mobility disability, respectively, compared to those with no/low FoF.
Conclusions: FoF was significantly associated with risk of mobility disability across the sites. The strength of this relationship appears to be different between the five sites.

1. Introduction

Fear of falling (FoF) is a major health problem among community-dwelling older adults that may contribute to avoidance of activities that they are capable of performing. Around 25% to 85% of older adults report FoF; among these, 20% to 55% curtail their physical activities as a result of their concerns (Murphy, Dubin, & Gill, 2003). Traditionally, FoF has been presented as a major psychological consequence of a previous fall. However, it is also reported by significant number of older adults who have never experienced a fall (Delbaere, Crombez, Van Den Noortgate, Willems, & Cambier, 2006; Scheffer et al., 2008). FoF could lead to a vicious cycle beginning with self-imposed reduction in physical activities, thus predisposing individuals to deconditioning leading to poor balance and poor musculoskeletal health, which in turn could cause disability, frailty, and further FoF (Delbaere et al., 2006; Fried et al., 2004; Scheffer, Schuurmans, van Dijk, van der Hooft, & de Rooij, 2008).

Mobility disability is a precursor of more than half of end-stage disability in older adults and it is more common among women

* Corresponding author at: School of Rehabilitation Therapy, Queen's University, Louise D. Acton Building, 31 George Street, Kingston, ON K7L 3N6, Canada.
E-mail address: nandinijd@yahoo.com (N. Deshpande).

http://dx.doi.org/10.1016/j.archger.2016.05.012
0167-4943/

(Fried, Bandeen-Roche, Chaves, & Johnson, 2000; Zunzunegui et al., 2015). It is usually defined as the self-reported difficulty to walk 400 m without resting or to climb a flight of stairs without support (Gill, Allore, Hardy, & Guo, 2006). Mobility disability is preventable and amenable to interventions (De Yebenes et al., 2003). Previous studies have identified a number of risk factors of mobility disability (Scheffer et al., 2008). FoF relation to mobility disability is not known. Understanding this relationship would provide a basis for screening those at risk and intervening to prevent transition to end-stage disability (De Yebenes et al., 2003; Gill et al., 2006). The *main objective* of this study was to examine FoF as a risk factor for mobility disability among community-dwelling older adults.

Growing body of evidence demonstrates important differences in the reported FoF and mobility disability in older adults across populations (Melzer, Lan, Tom, Deeg, & Guralnik, 2004; Mechakra-Tahiri, Freeman, Haddad, Samson, & Zunzunegui, 2012; Scheffer et al., 2008), and little scientific attention has been devoted to this matter. The wide variation in FoF definitions and measurement instruments used in previous studies prevent researchers from conducting meaningful comparisons between different sites (Scheffer et al., 2008). Therefore, a *secondary objective* of this study was to investigate the differences among five diverse international sites in terms of FoF and its relation to mobility disability. We hypothesized that FoF is related to mobility disability; however; the characteristics of FoF (e.g. total score, prevalence of FoF categories, see methods for details) and the strength of its relation to mobility disability differ across sites.

2. Methods

2.1. Participants and sampling strategy

The International Mobility in Aging Study (IMIAS) is a prospective cohort study designed to understand how life course factors affect mobility of community-dwelling older adults at five diverse sites. For initial recruitment in IMAIS, the Leganes Cognitive Test (LCT) was used to screen mental status, and those with $\geq$4 errors on the orientation scale of the LCT were excluded (De Yebenes et al., 2003). The LCT is a simple cognitive test with 32 items that has been created to be used with people with various levels of education. It results in two scores of orientation and memory and a global score of 0–32 points (De Yebenes et al., 2003). Overall, 1995 community-dwelling participants, aged between 65 and 74, were recruited in 2012 in the following cities: *Kingston,* Canada (n = 398, 212 women), *Saint-Hyacinthe,* Canada (n = 401, 210 women). *Tirana,* Albania (n = 394, 201 women), *Manizales,* Colombia (n = 400, 202 women), and *Natal,* Brazil (n = 402, 210 women). The study received approval from local ethics boards at the respective sites and all participants signed an informed consent form. Additional details about the main study are available in previous publications (Zunzunegui et al., 2015).

For the present study, IMIAS Baseline data collected in 2012 were used. Participants who did not complete the FoF questionnaire and those with possible dementia (LCT $\leq$ 22) were excluded (De Yebenes et al., 2003). The inclusion criterion based on LCT was different from the original study, since the original study excluded those with severe disorientation (those with $\geq$4 errors on the orientation subscale). The decision to exclude participants with possible dementia based on the fact that the FES-I explicitly documents concerns of falling, a concept that is related to cognitive appraisal.

2.2. Outcome measures

FoF was evaluated using the Falls Efficacy Scale-International questionnaire (FES-I), which is designed to quantify the level of concern about falling in older persons during sixteen social/physical activities both inside and outside the home. The level of falling concern is measured on a four-point Likert scale (1 = not at all concerned to 4 = very concerned) (Yardley et al., 2005). Thus, the FES-I score ranges between 16 and 64, with higher scores indicating greater concern. FES-I has been translated into several languages and has been tested and validated to be used across cultures in order to specifically quantify FoF (Camargos, Dias, Dias, & Freire, 2010; Kempen et al., 2007; Yardley et al., 2005). FES-I total score represented FoF severity in those reported FoF in any activity. Participants were also categorized using FES-I scores into three subgroups: no/low (16–19), moderate (20–27), and high (>27) concern about a fall (Delbaere, Close, Brodaty, Sachdev, & Lord, 2010a). Since there is no gold standard for determining cut-off points (Delbaere et al., 2010b), we decided to use cut-off points that have been previously used for a similar population of community-dwelling older adults, so the findings can be compared with other studies.

Mobility disability was defined as self-reported difficulty walking 400 m without help or difficulty climbing a flight of stairs without assistance (Gill et al., 2006). Potentially confounding demographic, physical, psychosocial, and health-related variables were included as covariates. For this purpose, age, sex, and years of formal education were recorded. Body Mass Index was calculated from a participant's weight and height measured in the study. Due to considerable differences in the actual amount of household income between the five sites, perceived sufficiency of household income was noted by asking "to what extent does your income allow you to meet your needs?" The responses were recorded as 1 = very well, 2 = suitably, 3 = not very well, and 4 = not at all. The living arrangements were dichotomized as living alone or not. Comorbidity was recorded as a total number of self-reported, physician-diagnosed chronic conditions (total number of comorbidities ranged from 0 to 8, based on how many disease/condition the participants reported. Diseases included in the questionnaire were hypertension, diabetes, cancer, chronic lung diseases, heart diseases, stroke, arthritis, and osteoporosis). Habitual binocular visual acuity was tested using the ETDRS Tumbling E chart placed at 2 m using their usual glasses/lenses. The number of correctly identified E's was recorded (Taylor, 1978). Grip strength was measured 3 times on the dominant side using a Jamar handgrip dynamometer (Promedics, Blackburn, UK) held in sitting position and the maximum value was used. The Center for Epidemiological Studies Depression scale (CES-D) (Fava, 1983) and LCT (De Yebenes et al., 2003) were used to measure depressive symptoms and global cognition, respectively. Fall history in the previous year was recorded as the number of self-reported falls. Falls were defined as coming to rest on the ground (or any other lower level) involuntarily.

2.3. Statistical analysis

The between-site differences in general characteristics and risk factors were identified using chi-square analysis or one-way analysis of variance (ANOVA), as appropriate. For those reported any FoF (FES-I score $\geq$ 17), two-way ANOVA was performed to test for significant differences based on site and sex on the total score of FoF (main effects), and test the significance of the interaction effect between the two factors (site x sex). A post-hoc analysis for the two-way ANOVA was carried out using Bonferroni adjustment. It has been reported that women have higher FoF, and, therefore, we used sex as a main factor in the two-way ANOVA. The differences in the distribution of covariates between those who reported mobility disability and those who did not were identified using chi square analysis or ANOVA, as appropriate. To account for the site-specific differences, the purposeful selection of covariates was