



Fear of falling in people with chronic obstructive pulmonary disease



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KEYWORDS

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Summary

Background: Increased fear of falling (FOF) has been associated with impaired physical function, reduced physical activity and increased fall risk in older adults. Preliminary evidence suggests that individuals with chronic obstructive pulmonary disease (COPD) may have an increased FOF. This study aims to compare the level of FOF in people with COPD with healthy controls, and to determine the associations between FOF and measures of physical function, physical activity and fall risk in COPD.

Methods: FOF was assessed in 40 participants with COPD and 25 age- and gender-matched controls using the Falls Efficacy Scale—International (FES-I). Physical function was evaluated using quadriceps hand-held dynamometry, the Berg Balance Scale and the Six-minute Walk Test. Associations between FOF, physical activity and fall risk were evaluated using the Physical Activity Scale for the Elderly and the Falls Risk in Older People – Community Setting. Pearson's correlation coefficient and stepwise multivariate linear regression were used.

Results: Individuals with COPD (mean \pm SD; age: 71 ± 8 years, FEV₁: 45 ± 16 %pred) had higher FOF compared to controls (FES-I: 25.0 ± 7.9 vs 20.2 ± 5.2 , $p = 0.01$). Higher FOF was associated with lower quadriceps strength ($p = 0.02$) and an impaired balance ($p < 0.01$); these explained 26% of the FOF variance. Reduced levels of physical activity ($p = 0.01$) and a higher fall risk ($p < 0.01$) were associated with an increased FOF in COPD.

Abbreviations: BBS, Berg Balance Scale; FES-I, Falls-Efficacy Scale – International; FOF, fear of falling; FROP-Com, Fall Risk for Older People – Community setting; HHD, hand-held dynamometry; ICC, Intraclass Correlation Coefficient; MDD, Minimal detectable difference; PASE, Physical Activity Scale for the Elderly; 6MWT, six-minute walk test.

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Conclusion: People with COPD have a higher FOF compared to the healthy peers, which is related to lower quadriceps muscle strength, impaired balance, lower levels of physical activity and an increased fall risk.

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Introduction

Falls in the elderly are a major health problem. One third of adults aged over 65 years and living in the community experience a fall annually [1], which can have significant physical consequences including injuries, hospitalization and increased mortality [2,3]. Falls may also have important psychological consequences leading to an increased fear of falling (FOF) in older adults [4]. While this fear is more prevalent among people with advanced age and a prior fall history, it also present in those who have not experienced prior falls [5]. Preliminary evidence suggests an increased FOF among people with chronic obstructive pulmonary disease (COPD) compared to those in the general elderly population [6,7].

Increased FOF in the elderly has been associated with impaired physical function, social isolation and decreased quality of life [8-11]. Lower muscle strength [12], impaired balance [13] and reduced exercise capacity [14] are physical function factors known to be associated with increased FOF in older adults, however, the relationship between FOF and these factors have not been studied in people with COPD. An increased FOF could also adversely influence the level of physical activity performed [15,16]. Importantly, a higher FOF is also a well-recognized predictor of future falls in older adults [4,17]. Although the importance of FOF assessment has been increasingly recognized in COPD [18], the relationship between FOF and its potential influence on activity levels and fall risk in this population are yet to be determined.

The primary aim of this study was to identify the proportion of people with COPD with a high FOF and the level of this fear compared to age- and gender-matched healthy controls. The secondary aim was to determine the relationship between FOF and physical functional measures including muscle strength, balance and exercise capacity and the associations between FOF, physical activity and fall risk in COPD.

Materials and methods

Study design

This is a controlled cross-sectional study. Assessments of all participants were completed in a single session in a hospital outpatient setting and university facilities. The protocol was approved by the Human Research Ethics Committee of the Royal Melbourne Hospital and The University of Melbourne with informed consent obtained from all participants. This study is reported following the Strengthening

the Reporting of Observational Studies in Epidemiology (STROBE) recommendations [19].

Study population

A consecutive sample of 40 people with COPD who attended the respiratory outpatient clinic at the Royal Melbourne Hospital, Melbourne, Australia, was included in the study. Inclusion criteria were: diagnosis of COPD according to international criteria [20]; community-dwelling and clinically stable in the 30 days prior to assessments [20]. Exclusion criteria were 'severely frail' to 'terminally ill individuals' [21], diagnosis of neurological or musculoskeletal conditions known to affect balance, untreated visual abnormality, impaired peripheral sensation or inability to understand spoken English. Similar exclusion criteria were used for recruitment of a convenience sample of community-dwelling healthy controls. Twenty-five healthy age- and gender-matched community-dwelling people with normal lung function (forced expiratory volume in one second (FEV₁) ≥ 80% predicted and FEV₁/forced vital capacity (FVC) ≥ 0.7) and smoking history of <10 pack-years were included. All participants were recruited and assessed during February 2011 to August 2012.

Measurements

Fear of falling

The Falls Efficacy Scale–International (FES-I) was used to assess FOF [22]. The FES-I is a 16-item self-reported questionnaire that evaluates concern about falling in a range of daily life and social activities, including going up and down stairs, cleaning the house and community walking with crowds. The level of concern is scored using a 4-point scale (1 = not at all, 2 = somewhat, 3 = fairly, 4 = very concerned). The 16-item FES-I is a reliable measure of FOF (Intraclass Correlation Coefficient (ICC) > 0.90) and has demonstrated validity [23] and internal consistency (Cronbach's alpha >0.90) in clinical populations with balance disturbances [24,25]. The FES-I is the recommended FOF assessment tool in community-dwelling older adults [26], and its cut-off of 23 points discriminates between low and high fall concern [23]. A change of 3.5 points has been estimated as the minimal detectable difference based on published data (MDD 95% CI) [23,27].

Physical function

Physical function measures included quadriceps muscle strength, balance, and functional exercise capacity. A hand held dynamometry (HHD) (Nicholas, model 01163, Lafayette Instruments, IN, USA) was used to assess quadriceps muscle strength on the dominant leg following a

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