

Relationship Between Fear of Falling, Balance Impairment and Functional Mobility in Community Dwelling Elderly

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Abstract

Fear of falling in elderly is a major cause of loss of independence, which has an effect on the physical function in them. The focus of the study is to find whether a relationship exist among fear of falling, balance impairment and functional mobility in the community dwelling elderly people. The sample consisted of 52 community dwelling elderly people of age between 65 years to 90 years (mean = 71.96, SD± 5.92). Fear of falling was measured using falls efficacy scale (FES), balance was measured using Berg balance scale (BBS) and functional mobility was assessed using the Timed Up and Go test (TUG). The data was analyzed using Pearson co-efficient of correlation to examine the relationship between FES, BBS and TUG test and with t-test. The correlation co-efficient between fall efficacy and balance performance was -0.97 ($p \leq 0.01$) and correlation coefficient between fall efficacy and TUG was 0.95 ($p \leq 0.05$). This study concluded that there was a significant association between the fall efficacy, the balance performance and the functional mobility in the elderly people. This relationship has an important implication for the development of the rehabilitation programs that aim to improve the balance confidence and diminish its impact on function in elderly people.

Introduction

Over the next several decades, the elderly people will represent a large segment of the population. According to WHO, the size of the elderly population in India increased from 20 million in 1951 to 57 million in 1991 and is about 84 million in 2001, and is expected that about 107 million in 2010, 198 million in 2030 and 326 million in 2050. The rapid increase in the number of old people in the population also raises various social, economic and health issues.

Elderly people have common geriatric problems like impaired mobility, falls, impaired cognition, urinary incontinence, etc¹. Out of this, falls are common events in the lives of older people and can result in a range of adverse outcomes, from minor bruises to fractures, disability, dependence and death. A "fall" is when a

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sudden, unintended loss of balance leaves the individual in contact with the floor or another surface such as a step or chair². In a community based study it was found that over 50 percent of falls among elderly persons result in at least some minor injury. Up to 2 percent of falls were found to result in the fracture of hip; other fractures (in the arm and pelvis) could occur in up to 5 percent of falls. Serious injuries (head and internal injuries, laceration) could occur in up to 10 percent of falls³.

There are many factors leads to or causes the fall in the elderly, these factors that cause or lead to falls are classified into two i.e. intrinsic factor and extrinsic factors. Falls are a complex interaction between intrinsic and extrinsic risk factors⁴. Over 400 risk factors for falling have been reported. There is uncertainty surrounding some of these risk factors, and one explanation is that risk of falls and injurious falls varies with functional status. Frail older people are at high risk of falling and of injuring themselves, but at the other end of the spectrum, healthy people who engage in large quantities of diverse and

challenging physical activities, also have a disproportionately high risk of falling.

Interestingly fear of falling also contributes to the falls. Elderly with fear of falling often change their gait, decrease their activity, or attempt to use assistive devices to prevent falling. The decrease in activity and walking is perhaps the worst consequences of a fear of falling, leading to de-conditioning and overall decrease in strength^{5,6}. Developing a fear of falling is more prevalent with increasing age and fall history, but it is not only limited to individuals with a history of falls. In 1982, Murphy and Isaacs published their classic article on “post-fall syndrome” in which elderly people who had fallen, developed severe anxiety that affected their ability to stand and walk unsupported⁷. Subsequent research demonstrated that elderly people can develop fear of falling even when they have not fallen.

Community studies that are limited to elderly people who have actually fallen have reported prevalence rates of 32–83%, strikingly 33–46% of community-dwelling elders who have not fallen also report fear of falling. Among elderly persons who are afraid of falling, up to 70% acknowledge avoiding activities because of this fear⁸⁻¹⁰. In some cases, individuals become housebound as a result of their fear. Activity restriction is, in itself, a risk factor for falls because it can lead to muscle atrophy, de-conditioning and poorer balance. Curtailment of activities can also lead to social isolation¹¹⁻¹². Thus, fear of falling can contribute to both functional decline and impaired quality of life.

Over the years, various definitions of fear of falling have evolved. Some authors have focused purely on the fear, while others have included avoidance of activities as a consequence of the fear. A few authors have avoided the term “fear” and have instead focused on the person’s loss of confidence in balance and walking. Efforts to measure fear of falling have focused on using the concept of “self-efficacy” in place of “fear”. Self-efficacy, a concept based in the field of psychology, refers to an individual’s perceived capability within a specific domain of activities. Assessing falls related self-efficacy in performing specific activities or tasks, rather than global fear of falling, should reveal the extent to which a person believes he or she is able to participate in specific activities without falling.

Falls efficacy scale (FES), developed by Tinetti et al, is an instrument to measure fear of falling based on the operational definition of this fear as “low perceived self-efficacy at avoiding falls during essential, non-hazardous activities of daily living.” It is a 10-item questionnaire, either self-administered or administered through interview, that asks respondents to rate their level of confidence in performing common activities such as “taking a shower

or bath,” “getting dressed,” and “reaching into cabinets” without falling. Each item is rated on a 10-point scale, with 1 indicating “extreme confidence” and 10 indicating “no confidence at all”. The reliability and validity of the FES were assessed in two samples of community-living elderly persons. The FES showed good test-retest reliability (Pearson’s correlation 0.71). Subjects who reported avoiding activities because of fear of falling had higher FES scores, representing lower self-efficacy or confidence, than subjects not reporting fear of falling.

The FES has been widely used in studies examining the effect of fear of falling on physical function. Several studies have demonstrated a strong link between falls-related self-efficacy as measured by the FES and physical function. Scores on the FES have been found to be highly correlated with self-reports of basic and instrumental activities of daily living (ADL) status and physical function and moderately associated with level of social activity. Prospective studies have shown that high base line FES scores are associated with greater declines in self-report ADL status, deterioration of health-related quality of life, and an increased risk for falling in community-dwelling elderly people¹³.

Cumming and colleagues reported that low baseline FES scores in community-dwelling elderly people were associated with greater declines in self-reported ADL performance over a 12-month period¹⁴. Mendes de Leon and colleagues examined the role of falls-related self-efficacy on changes in physical functioning in community-dwelling elderly people in an effort to determine if self-efficacy would be protective of self-care behaviors¹⁵. Physical functioning was measured using a self-report of ADL status. Myers and colleagues investigated the association between balance confidence, as measured by the Activities specific balance confidence scale (ABC Scale), and balance performance, as measured by static posturography, in elderly people¹⁶. Although the results of these studies suggest that individuals who have a concern about their ability to avoid falling may have impaired balance, our understanding of the relationship between self efficacy and actual balance ability is quite limited. Thus, it remains unclear whether the ability to perform typical balance and mobility tasks is impaired in people who report diminished self efficacy i.e. the elderly people those with fear of falling. The purpose of this study was to find whether a relationship exists among fear of falling, balance impairment and functional mobility.

Material and Method

The subjects were a statistically adequate sample of 52 (Male N = 19, 36.5%, Female N = 33, 63.5%) community dwelling elderly people of age between 65 years to 90 years (Mean 71.96, SD± 5.92) with or without the history

fall, those who were coming to Physical Medicine and Rehabilitation Center, Pondicherry. All participants were community dwelling subject who were able to walk without human assistance and were able to follow the instructions given to them. Exclusion criteria are listed below. Eligible participants were included for the study. Before the collection of the data informed consent was obtained.

Criteria for Excluding Individuals from Study Participation

- Unstable or limiting cardiac disease (e.g., angina)
- History of myocardial infarction, coronary artery bypass or other cardiac surgery within the previous 6 months
- Respiratory conditions requiring oxygen supplementation or frequent use of inhalers
- History of neurological disease (e.g., Stroke, Parkinson disease) with residual impairment
- History of fracture within the previous 6 months (especially spinal or hip fracture)
- Severely limiting arthritis, joint instability, or back pain
- Total joint replacement within the previous 6 months
- Abdominal surgery within the previous 6 months
- Documented dementia or significant clinical depression
- Surgery, chemotherapy, or radiation therapy for cancer within the previous 6 months
- Acute illness or injury on the day of the functional assessment clinic.

The subjects were interviewed and the information gathered about their demographic data, living situation, living condition health related information like past medical history, use of assistive device, and use of medication, and fall-related information fear of falling [yes/no], fall history and frequency, the need for medical attention due to falls. The selection of questions to include in the interview was based on clinical experience as well as correlates of fear of falling identified in the literatures. Fall history was considered to be the number of falls in the past year that was not the result of dizziness, fainting, sustaining a violent blow, loss of consciousness, or other overwhelming external factors.

The falls efficacy Scale (FES) questionnaire was then administered through interview. Following the interview, 2 physical performance measures were used to assess balance performance and functional mobility. The Berg Balance Scale (BBS) and the Timed Up and Go Test (TUG) were administered. Each new task was explained and demonstrated, and the subject asked if he or she felt safe performing that task. Subjects who did not feel safe performing a task were reassured that they could attempt to complete as much of the task as possible while they were being closely guarded for safety. If the subject still did not feel safe attempting the task, the lowest possible

score is entered for the task and continued to the next item. For the TUG and the last 3 items on the BBS, each subject was allowed one practice trial before scoring to ensure that these more difficult tasks were understood. Subjects were allowed to take more frequent rest periods as needed. The majority of subjects required no additional rest periods. Assistive devices were not used during the administration of the BBS. If the task was performed with the use of an assistive device, a score of 0 was given. Since the assistive device could assist with balance abilities.

Berg Balance Scale: The Berg Balance Scale is a performance-based measure designed to monitor performance during balance activities, and to predict multiple falls in community-dwelling and institutionalized older adults¹⁷. The scores on the 14 items are combined for a total score, which can range from 0 to 56, with a higher score relating to better performance.

The Inter rater reliability of Berg Balance Scale was determined interclass correlation coefficient (ICC) = .98, for individual items, reliability ranged from .71 to .99. Concurrent validity for the Berg Balance Scale as a measure of balance and mobility was determined by comparison with tests of postural sway (Pearson $r=.55$), the POMA balance subscale (Pearson $r=.91$). The Berg Balance Scale has sensitivity=84% and specificity=78% using a cutoff score for referral of 48¹⁸. In addition, a score of less than 45 was shown to be predictive of risk for recurrent falls by a meta-analysis.

Timed Up And Go Test (TUG): The TUG is a widely used performance-based measure of functional mobility in community-dwelling older adults¹⁹. Reliability and validity have been described for the TUG. Inter rater reliability (ICC=.99) and intra rater reliability (ICC=.99) were established for a sample of 60 patients (mean age 79.5years). Scores have been reported for the TUG, distinguishing between older adults who are mostly independent ($d < 20$ seconds) and those who need some help in every day activities ($e > 30$ seconds). However, an intermediate range of scores referred to as being in a gray zone (20–29seconds) represents older adults with varying levels of independence in mobility²⁰.

Results

The Pearson coefficient of correlation was used to examine the relationship among the FES (Falls efficacy scale), BBS (Berg Balance scale), and TUG (Timed Up and Go test) Scale scores, with FES score as the dependent variable.

The Pearson's correlation coefficient between the falls Efficacy Scale and the Berg Balance Scale were -0.097 which showed a high correlation between them with the significance of $p < 0.01$. The correlation between the

Falls Efficacy Scale (FES) and Timed Up and Go test (TUG) was 0.95 with the significance of $p < 0.05$ which also showed a strong correlation between them.

Mean test scores (\pm SD) for the sample were as follows: FES Scale 61.21 ± 10.42 , BBS 46 ± 4.70 , and TUG 18.43 ± 3.30 seconds. The mean BBS score was just above the established cutoff of 45 for fall risk, and the mean TUG time was slightly longer than the cutoff of 14 seconds for fall risk.

	<i>Correlation coefficient (FES)</i>	<i>p - value (t-test)</i>
<i>BBS</i>	-0.97	0.01
<i>TUG</i>	0.95	0.05

Table- 1. Pearson correlation for falls efficacy scale (FES), Berg Balance Scale (BBS) and timed up and go test (TUG).

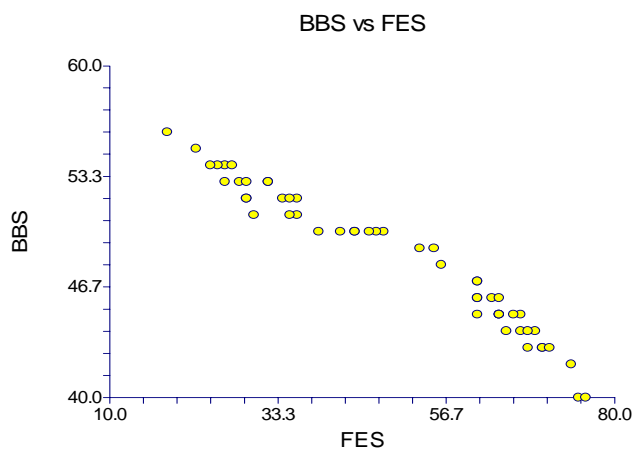


Figure 1: Scatter diagram. Correlation between falls efficacy scale (FES) vs Berg Balance Scale (BBS).

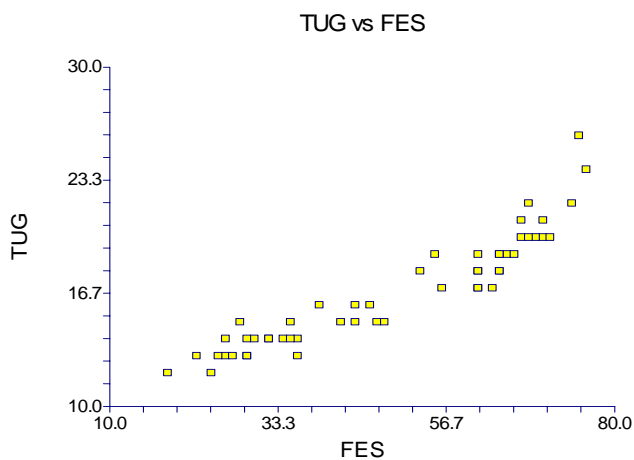


Figure 2: Scatter diagram. Correlation between falls efficacy scale (FES) vs Timed Up and Go Test (TUG).

Discussion

The result of this study showed the association between the fall efficacy, balance performance and the functional mobility in the elderly people. This finding suggested that elderly people those who had the fear of falling might have the balance deficit. It showed the relationship between the fall efficacy (fear of falling) and the balance ability during the functional tasks. Fear of falling also contributed to explain self efficacy, indicating that elderly people who report high score of self efficacy not only have impaired balance, but also are fearful that they are likely to fall due to these balance limitations. This relation between the fear of falling and the balance was in agreement with Maki et al. (1991, 1994) results which showed that older adults who reported a fear of falling demonstrated larger amplitude of postural sway when blindfolded and poorer scores when timed on a one-leg stance test compared to those who did not report fear of falling.

TUG assessed ability to maintain balance during timed locomotion and ambulatory transfers. It also correlated with self efficacy (Falls efficacy scale) demonstrating that a relationship existed between fear of falling and functional mobility in the elderly population. Similar findings were reported from studies that investigated fear of falling and restriction of activity and self-reported declines in mobility and reduced physical function in people with low fall related self-efficacy.

The finding also demonstrated that the ability to maintain balance during functional activities could be present irrespective of fall history in elderly people. People with fear of falling might avoid falls, despite having impaired balance or being at risk for falls, by limiting their participation in daily functional activities. From the data obtain it was found that 18 (34.6%) of them had the history of fall with one of had fracture of shoulder after fall and others had the swelling or laceration and bruises after the fall. It was also found that those who had history of fall also had the fear of falling. The percentage of fear of falling (N = 23, 44.2%) was greater than the history of falls (N=18, 34.6%). Among these 66.67% were females and 33.33% were males. This suggests that the elderly develop the fear of falling with or without the history of falls.

It is unclear whether impaired balance has an impact on falls efficacy or whether diminished falls efficacy results in a deterioration of balance ability. We cannot assume that improved balance will result in improved falls efficacy until we understand the etiology of this complex problem. Several authors thus far have explored whether fear of falling and falls-related self-efficacy can be modified by focusing on the psychosocial factors implicated as the basis for fear of falling, or by intervening at the physical

level. Tinetti and Powell described a multifaceted clinical intervention for an elderly man exhibiting avoidance of activity due to a fear of falling after several hospitalizations. This subject returned to his prior level of activity after a prescribed program focused on mobility training, reduction of fall risk, and graded increases in activity level²¹. Randomized controlled trials examining whether falls efficacy can be modified through balance retraining are needed to be studied.

Conclusion

The results of this study suggest that balance impairments are present in people with fear of falling. This relationship has important implications for the development of rehabilitation programs that aim to improve balance confidence and diminished its impact on function in elderly people. The important impact of falls includes significant morbidity, mortality, functional deterioration, hospitalization and expenditure to health and social services. Understanding how multiple risk factors, including fear of falling, interact to influence postural control strategies is critical for accurate assessment and treatment of balance problems. Better understanding of the risk factors may help to reduce fall risk, reduce physical and social activity restriction, maintain independence and enhance quality of life in older adults and individuals with balance problems.

There is a strong emphasis on multidisciplinary working in prevention of falling, reflecting the multi-factorial and complex nature of falls. Multidisciplinary team those are involved in the development and implementation of new practices in falls prevention should, wherever possible be undertaken as part of a randomized controlled trial to establish the safety, effectiveness and cost-effectiveness of new practice. In addition further studies are needed to refine interventions, improve screening for fear of falling, risk of falls, and to develop approaches in high-risk groups. Future studies should aim at improving our understanding of the interaction between falls efficacy and balance performance.

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