

Correlation of Balance with Fear of Fall and Physical Function in Old Age People - A Cross Sectional Study

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Abstract: *Introduction:* Fear of falling in elderly is a major cause of loss of independence, which has an effect on the physical function in them. The aim of the study was to correlate balance with fear of fall and physical function in elderly people. *Material and Method:* A correlation study was conducted at New Civil Hospital where balance, fear of fall and physical function were assessed in 90 subject both males and females. Exclusion criteria were subject with history of neurological diseases, fracture or acute illness or injury on the day of functional assessment. Outcome measure included fear of fall measured using Morse Fall Scale (MFS), Balance was measured using Berg Balance Scale (BBS) and physical function was assessed using FIM scale. Level of significance was kept at 5%. Spearman correlation was applied to find the correlation between BBS and MFS and between BBS and FIM. *Result:* A negative correlation was found between BBS and MFS ($r = -0.71235$) and a positive correlation between BBS and FIM ($r = 0.774929$) which were significant. *Conclusion:* The study concluded that there is a correlation of balance and fear of fall and physical function in elderly people.

Keywords: Balance, Fear of Fall, Physical function, Old age people

1. Introduction

Frail or Aged refers to a person over the age of 65 years experiencing either chronic illness or disability of any form of over 1 year's duration.^[1]

Elderly people have common geriatric problems like impaired mobility, falls, impaired cognition, urinary incontinence, etc. 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 sudden, unintended loss of balance leaves the individual in contact with the floor or another surface such as a step or chair.^[2]

Balance disorders in the geriatric population are often a multifactorial condition. Weakness in the core stabilizing muscles, altered muscle activation patterns, loss of proprioception, and an inability to control normal postural sway can all result in decreased balance in the elderly. A decrease in physiological reserves as we age, limits the ability to react quickly to perturbation.^[3, 4]

Elderly with fear of fall 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. 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.^[5, 6]

Fall prevention has, therefore been recognized as a priority area for research and intervention^[7]. The most important of

these factors include aging, chronic illness, sedentary lifestyle^[8], orthopedic impairments, cardiac disorders^[9], visual impairment^[10], muscle weakness^[11] and impaired balance^[9]. Hence Balance has been shown to be an important predictor of falls within the elderly population^[12].

The performance of all activities of daily living requires good balance control while at static posture or at dynamic posture that require moving from one position to another. Maintenance of balance requires the co-ordination of sensory, neural and musculoskeletal systems^[13, 14]. This has the potential to affect balance, restrict safe mobility, increase the likelihood of a fall and adversely affect quality of life^[15, 16].

Therefore, the assessment of balance with older people is important to direct appropriate interventions to improve balance performance^[17].

Risk factors for falls can be described as one or more intrinsic, extrinsic, and/or situational factors that interact in a synergistic relationship and increase one's risk for falling. Intrinsic factors, commonly include gender, psychological status (i.e., fear of falling, depression, anxiety), and age-related declines in strength, balance, mobility, physical and/or cognitive functioning. Extrinsic risk factors relate to factors outside of an individual and can include hazards in the physical environment (e.g., poor lighting, slippery floors, unsafe stairways, uneven surfaces). Thus, knowing and understanding which factors increase an older adult's falls risk is essential for preventing future falls and reducing the total number of falls that occur each year.^[18]

More than half of the all elderly falls occur in home. The most common site of fall is bedroom mainly getting into or out of bed, which accounts for approximately one third of these home falls other home sites include change in surface or lighting (12%), bathroom (10%), kitchen (10%), living room (8%), utility room (5%).^[19]

As there are no clear cut study shows that correlation between balance, fall and physical function in old age people, so the primary aim of the present study is to determine whether there is correlation of balance with fall and physical function in old age people.

2. Aims and Objective

The aim of the study was to correlate the balance with fear of fall and physical function in old age people.

3. Methodology

Study Design: A Cross sectional study

Study Setting: New Civil Hospital, Surat

Sample Size: 90 elderly people

Sampling Technique: Samples are selected by simple randomized technique which is based on inclusion and exclusion criteria.

Inclusion Criteria

- Both male and female
- Elderly population above 50 years
- Subjects with good understanding ability
- Subjects who are willing to participate in this study
- Subjects who are medically stable

Exclusion Criteria

- Neurological disorders like Parkinsonism, Epilepsy, Dementia, Alzheimer disease, Peripheral neuropathy, Multiple sclerosis, Traumatic brain injury.
- Visual impairment
- Lower or upper limb amputation.

Material Used

Two firm chair

- One with arm support
- One without arm support

Stopwatch or wristwatch

15 feet (10m) walkway

Ruler or inch tape



Outcome Measure

- Berg Balance Scale used for to measure balance in old age people.
- Morse Fall Scale used for fall in old age people.
- Functional Independence Measure scale used to measure ADL activity in old age people.

4. Method

Fall history was considered to be the number of falls in the last 3 months that was not the result of dizziness, fainting, sustaining a violent blow, loss of consciousness, or other

overwhelming external factors. The MFS was then administered through interview. Following the interview, physical performance measures were used to assess balance performance and functional mobility. The Berg Balance Scale (BBS) and the FIM scale were administered respectively.

Berg balance scale is an objective measure of static and dynamic balance abilities. The scale consists of 14 functional tasks commonly performed in everyday life. Scoring uses a five point ordinal scale with scores ranging from 0 to 4. A score 4 is used to indicate that the patient

performs independently and a score 0 is used for unable to perform. A maximum score of 56 points is possible. A score of 45 or below is associated with a high fall risk and each one point drop in score ranging from 54 to 36 is associated with a 6 to 8 percent increase in fall risk.^[20]

MFS is a rapid and simple method of assessing a patient's likelihood of falling. It consist of 6 variables that are quick & easy to score and it has been shown to have predictive validity & interrater reliability.^[21]

FIM scale use as a functional assessment instrument for a old age people. It was intendend to measure a patient's disability in term of the need for assistance. FIM scale is comprised of 18 items, each item is score on a 7 point ordinal scale, ranging from a score of 1 to score of 7. The total score for FIM scale will be a value between 18 to 126 .The higher the score, the more independent the patient is in performing the task associated with that item.^[22]



Picture 1: Standing Unsupported One Foot In Front



Picture 2: Standing Unsupported With Feet Together

Ethical Consideration

Procedure followed were in accordance with the ethical standards of Helsinki declaration of 1975, as revised in 2000.^[23]

5. Results

In this study 90 elderly people assessed for balance, fear of fall and physical functional capacity.

Statistical Analysis

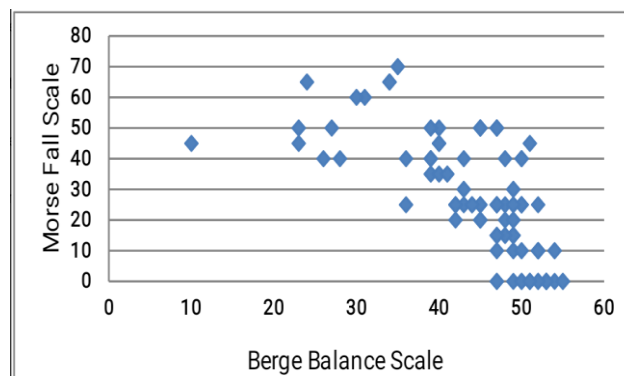
Result is expressed by calculating correlation coefficient (r). The extent of correlation varies between minus one and plus one, i.e., $-1 \leq r \leq 1$.

If $r = +1$, it shows that both variables are directly proportional and fully correlate with each other and it shows positive correlation.

If $r = -1$, it shows that both variables are inversely proportional to each other and it shows negative correlation.

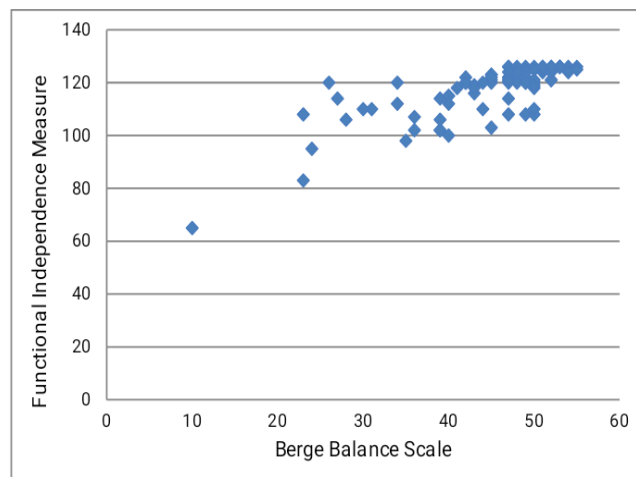
For this study, $r = -0.71$ for balance and fall, that shows inversely proportional to each other and $r = 0.77$ for balance and ADL, that shows directly proportional to each other

Chart of Correlation of BBS-MFS-FIM SCALE



Correlation of BBS and MFS

This scatter chart shows that, as the Berge Balance Scale of the elder people increases the Morse Fall Scale of the same decreases. This proved that there is negative correlation between this two scale.



Correlation of BBS and FIM

This scatter chart shows that, as the Berge Balance Scale of the elder people increases the Functional Independence Measure Scale of the same increases. This proves that there is a positive correlation between Berge Balance Scale and Functional Independence Scale.

6. 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 shows that there is a negative correlation between BBS and MFS. 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.^[24]

Self efficacy (MFS) demonstrating that a relationship existed between fear of falling and functional mobility in the elderly population. 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.

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.

It is unclear whether impaired balance has an impact on falls efficacy in a deterioration of balance ability. Another study by Hinman et al measured static postural sway (antero-posterior, lateral and total) using a swayometer on two different surfaces and under two visual conditions and dynamic standing balance was assessed using the 'step test'. They concluded that balance deficits can be identified in the elderly population using simple, inexpensive measures.

7. Limitation of the Study

- Large sample size should be taken.
- Components of dynamic balance is not included in the study for assessment of Balance

8. Scope of the Study

- BBS does not include dynamic components of Balance so some other scale can also be used to assess the dynamic balance of older age people
- Also the Gait Component can also be added in assessing the Balance of the older age individual

9. Conclusion

The study concluded that there is a correlation of fear of fall and balance and physical function in elderly population. There is a negative correlation between BBS and MFS and positive correlation between BBS and FIM scale.

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.

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