

Correlation of Balance and Gait with Mobility in Elderly People - A Cross Sectional Study

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Abstract: Introduction: Demographics have shifted with increasing life expectancy that also leads to higher elderly population. The shift in demographics has an important health implication as the aging process is related with declines in health and function. The aim of the study was to correlate balance and gait with mobility in elderly people. Material and Method: A correlation study was conducted at New Civil Hospital where Balance, Gait and Mobility was assessed in 90 subject both males and females. Exclusion criteria were subject with history of participants with balance impairment related to neurological condition, visual impairment and lower and upper limb amputations. Outcome measure included balance & gait measured using Performance Oriented Mobility Assessment (POMA) and Mobility in elderly individuals by Elderly Mobility Scale(EMS). This study had reported mean $\pm$ SD 14.3 $\pm$ 2.64 subscales for balance and for gait mean $\pm$ SD subscale was 9.9 $\pm$ 2.4. Mean $\pm$ SD of POMA scale was 24.2 $\pm$ 4.8. Result: Present study reported association between Performance Oriented Mobility Assessment (POMA) and Elderly Mobility Scale (EMS) in the elderly people. This finding revealed that elderly people with affected mobility had low POMA and EMS score. It shows that there was a positive correlation between POMA and EMS. Conclusion: The study concluded that there is a correlation of Balance and Gait with the Mobility in elderly people.

Keywords: Elderly people, Mobility, Gait, Balance, POMA scale

1. Introduction

Frail, 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]

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. 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.^[3,4]

Fall prevention has, therefore been recognized as a priority area for research and intervention^[5] The most important of these factors include aging, chronic illness, sedentary lifestyle^[6], orthopedic impairments, cardiac disorders^[7], visual impairment^[8], muscle weakness^[9] and impaired balance^[7]. Hence Balance has been shown to be an important predictor of falls within the elderly population^[10].

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^[11,12]. This has

the potential to affect balance, restrict safe mobility, increase the likelihood of a fall and adversely affect quality of life^[13, 14]. Therefore, the assessment of balance with older people is important to direct appropriate interventions to improve balance performance^[15].

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.^[16]

More than half of the all elderly falls occur in home is 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%).^[17]

Mobility is necessary for accessing commodities, making use of neighborhood facilities, and participation in meaningful social, cultural, and physical activities. Mobility also promotes healthy aging as it relates to the basic human need for physical movement. Unmet physical activity need, defined as inability to increase physical activity despite being willing to do so, is common among community-living older people who have mobility problems and who report negative environmental features in their neighbourhood.^[18]

Walking is one of the more frequently performed sensorimotor tasks in everyday life. It relies on a complex, simultaneous interaction of the motor system, sensory control, and cognitive functions. The diagnostic assessment of gait disturbances in old age requires a clear distinction of pathological findings from the normal, physiological changes of aging. Spontaneous walking speed normally decreases by about 1% per year from age 60 onward.^[19]

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

Aims and Objective

The aim of the study is to correlate Balance and Gait with Mobility in elderly people

2. 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:

- Chair without arm support
- Stopwatch or wristwatch
- 15 feet (10m) walkway

Outcome Measure

Tinetti Performance Oriented Mobility Assessment scale used to assess Balance and Gait in old age people.

Elderly Mobility scale used to measure Mobility in old age people.

Method

Study was conducted in 95 elderly people, from which 5 are excluded because of balance problem. The POMA scale was administered through interview. Following the interview, physical performance measures were used to assess balance performance and gait. The Elderly Mobility Scale (EMS) administered respectively.

POMA is an objective measure of static and dynamic balance abilities. The scale consists of 14 functional tasks commonly performed in everyday life. Scored on a three point ordinal scale which ranges from 0 to 2. "2" indicates the highest level of independence, and "0" indicates the highest level of impairment. The two part scale includes a total balance score of 16 and total gait score of 12, for a total possible score of 28. Scores of 25-28 indicate low fall risk, 19-24 medium fall risk, and < 19 high fall risk^[20]

The EMS is a 20 point validated assessment tool for the assessment of frail elderly subjects (Smith 1994). The EMS is measured on an ordinal scale. EMS > 14 = home. EMS between 10 and 14 = borderline in terms of safe mobility and independence in activities of daily living (ADL) i.e. home with help. EMS < 10 = high level of help with mobility and ADL.^[21]

Ethical Consideration

Procedure followed were in accordance with the ethical standards of Helsinki declaration of 1975, as revised in 2000.^[22]

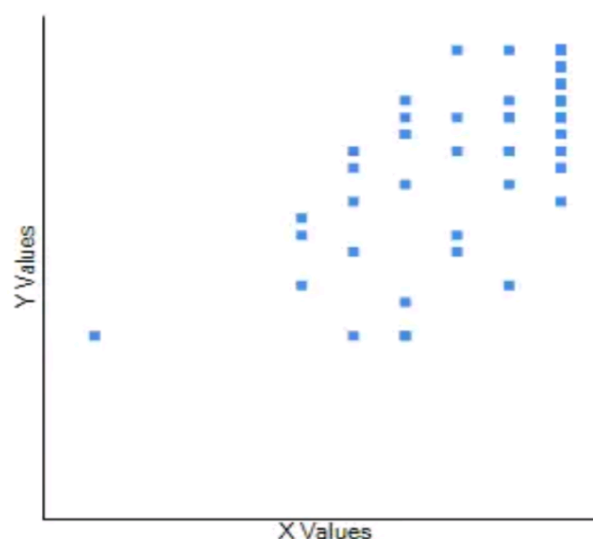
3. Results

This study is conducted in 90 elderly people to correlate between performance oriented mobility assessment and elderly mobility scale

3.1 Statistical Analysis

- This scatter diagram shows positive correlation between POMA and EMS.
- This shows as POMS scale score increase or decrease EMS score change.

Chart of Correlation of POMS & EMS SCALE



4. Discussion

Performance oriented mobility assessment gives in detail assessment of standing, sit to stand and gait in compare to elderly mobility scale. Performance oriented mobility assessment having in detail assessment of balance and gait with or without difficulty while elderly mobility scale shows

elders are dependent or independent. The finding also demonstrated that the ability to maintain balance during functional activities could be present 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.

Performance oriented mobility assessment scale takes more time and effort to take assessment of balance and gait. Elderly Mobility scale takes less time and it is easy to assess mobility in elderly people. Performance oriented mobility assessment and elderly Mobility scale both gives idea about mobility of every day activity in elderly people.

The result of this study showed the association between performances oriented mobility assessment and elderly mobility scale in the elderly people. This finding suggested that elderly people those who had mobility affected will be having low POMA and EMS score. It shows that there is a positive correlation between POMA and EMS. Performance oriented mobility assessment (POMA) tool is an easily administered task-oriented test that measures an older adult's gait and balance abilities. Elderly Mobility Scale (EMS) measures assessment of mobility.

4.1 Limitation of the Study

- Large sample size should be taken.
- Lower limb muscle strength in elderly people is also not taken into consideration related to Balance, Gait and Mobility

4.2 Scope of the Study

- The Functional Reach component of EMS is not well defined related to static or dynamic Functional Reach. So other scale can also be used to assess the static and dynamic Functional Reach in elderly people
- Also Quality Of Life of the Elderly can be correlated with Balance, Gait and Mobility components in elderly people

5. Conclusion

The study concluded that there is a correlation between balance and gait with mobility in elderly population. Thus, there is a positive correlation between POMA and EMS.

This relationship has important implications for the development of rehabilitation programs that aim to improve balance confidence and diminished its impact on mobility in elderly people.

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References

- [1] Yuginovich, t. And s. Pearce. Experiences of consumers over 65, their cares and health professionals on the community in relation to the use of assistive technology: a comprehensive systematic review. The jbi database of systematic reviews and implementation reports, 2011. 9 (32 suppl): p. S163-s178.
- [2] Koski k, luukinen h, laippala p, and kivela sl. Risk factors for major injurious falls among the home-dwelling elderly by functional abilities. *Gerontol* 1998; 44(4): 232-8.
- [3] Cumming rg, salked g, thomas m, szonyi g. Prospective study of the impact of fear of falling on activities of daily living, sf-36 scores, and nursing home admission. *J gerontol a biol sci med sci*. 2000; 55: m299-m305.
- [4] Mendes de leon cf, seeman te, baker di, et al. Self efficacy, physical decline, and change in functioning in community – living elders: a prospective study . *J gerontol b psychol sci soc sci* . 1996; 51:s183-s190.
- [5] Myers h. Hospital fall risk assessment tools: a critique of the literature. *Int j nurs pract* 2003,
- [6] Hauer k, rost b, rutschle k, opitz h, specht n, bartsch p, oster p, schlierf g. Exercise training for rehabilitation and secondary prevention of falls in geriatric patients with a history of injurious falls. *J am geriatr ic soc* 200, 49(1):10-20.
- [7] Bogle thorbahn ld, newton ra. Use of the berg balance test to predict falls in elderly persons. *Phys ther* 1996, 76(6):576-83.
- [8] Okuzumi h, tanaka a, haishi k, meguro ki, yamazaki h, nakamura t. Age-related changes in postural control and locomotion. *Percept mot skills* 1995, 81: 991-4.
- [9] Shumway-cook a, gruber w, baldwin m, liao s. The effect of multidimensional exercises on balance, mobility, and fall risk in community-dwelling older adults. *Phys ther* 1997, 77(1):46- 57.
- [10] Berg ko, maki be, williams ji, holliday pj, wood-dauphinee sl. Clinical and laboratory measures of postural balance in an elderly population. *Arch phys med rehabil* 1992, 73(11):1073-80.
- [11] Berg k, wood-dauphinee s, williams j, gayton d. Measuring the balance in the elderly; Preliminary development of an instrument physiotherapy canada. 1989a; 41(6); 304-11.
- [12] Huxham f, goldie pa, patla,ae. Theoretical considerations in balance assessment. *Australian journal of physiotherapy*. 2001; 47; 89-100.
- [13] Berg k. Balance and its measure in the elderly; a review. *Physiotherapy canada*. 1989b; 41(5); 240-245.
- [14] Patla a, frank js, winter da. Balance control in the elderly: implications for clinical assessment and rehabilitation. *Canadian journal of public health*. 1992; 83 suppl 2; s29-s33.
- [15] Lord s, dayhew j. Visual risk factors for falls in older people. *Journal of the american geriatrics society*. 2001; 49(5); 508-515.
- [16] Vellas bj, wayne sj, romero l, baumgartner rn, rubenstein lz, garry pj. One-leg balance is an important predictor of injurious falls in older persons. *J am geriatr soc* 1997, 45(6):735-8.

- [17] Tideiksaar r. Falling in old age : its prevention and management, 2nd ed.volo 22 of springer series on adulthood and aging issue 22 of adulthood and aging series, new york, springer publishing co 1997.
- [18] Taina rantanen. Promoting mobility in older people.prev med public health. 2013 jan; 46(suppl 1): s50-s54.
- [19] Ashton-miller ja. Age-associated changes in the biomechanics of gait and gait-related falls in older adults.
- [20] Tinetti me. Performance-oriented assessment of mobility problems in elderly patients. JAGS 1986; 34: 119-126.
- [21] Rachael Smith.Validation and Reliability of the Elderly Mobility Scale. The Chartered Society of Physiotherapy. 10 November 1994;80(11):744-748.
- [22] WMA Declared of Helsinki.59th General Assembly, seoul, Republic of Korea, October 2008.