

Original article

Balance performance: Gender differences in Indian elderly

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Abstract:

Need of study: There are mixed reviews about whether gender has any influence on balance abilities in elderly hence, this study was planned to analyse effect of gender on static, dynamic and functional balance in elderly.

Purpose: To study effect of gender on balance performance in healthy elderly

Method: 550 healthy male and female elderly were assessed using Forward reach test(FRT), Timed up and go test(TUG), Berg balance scale(BBS). The data was analysed using unpaired t test.

Result: There was no significant difference in balance scores for any of the outcome measures in male and female elderly .

Conclusion: Balance abilities are not influenced by gender in elderly.

Keywords: balance, elderly, confidence

Introduction:

India is on verge of being called as a geriatric nation due to its rapidly increasing no of elderly.¹ As the life expectancy of an individual is increasing, so is the cost of care.² The cost of care is a result of falls which are faced commonly by elderly. ³Known structural and physiological changes in elderly lead to falls.^{2,3} Factors like strength, balance, vision, vestibular insufficiency ,height, weight, bony deformities and proprioception have found to influence balance in elderly.^{4 .5} Age related changes in all these parameters are gender specific.^{6,7,8} Whether gender has any influence on balance is still controversial .^{9,10} Knowing the gender which is more prone for balance affection can help a health care professional to tap hidden balance problems and start appropriate interventions in that gender individual before it starts affecting functional independence for him/her. This study was planned as a preliminary assessment for another

longitudinal study with the objective to analyse the influence of gender on balance in Indian elderly.

Materials and methods:

Research design: cross sectional

Participant criteria:

Inclusion criteria: minimum 65 years of age, ambulating without assistive device, independent in home and community environment, community visit at least 3 times a week, both genders, willingness and ability to participate in study

Exclusion criteria: any known neurological problems(stroke, parkinsonism, motor neuron disease, paraplegia), sensory loss, known orthopaedic problems(amputation, symptomatic lower limb arthritis, lower limb deformities, total hip and knee replacement), inability to follow commands, regular exercises for more than 2hrs/ week, symptomatic coronary artery diseases.

Setting of study: parks, community centres

Sample size: 550(275 male and 275 female participants)

Sampling method: convenience

Outcome measures¹¹:

1) Forward Reach Test (FRT):

A yard stick was taped at level of acromion process height of the subject. He/she was asked to stand perpendicular to it with arm flexed to 90 degrees and hand in a fist. Position of 3rd metacarpal head on the yardstick was recorded. Subject was instructed to reach as far forward as possible without losing his/her balance, lifting his heels, or taking a step. Again position of 3rd metacarpal head on the yardstick was marked. Difference between the two positions was taken as a FRT measure. 2 practice trials were allowed with a rest period of 30 sec in each trial. Average of the next 3 trials was used to obtain the final score.

2) Timed Up and Go Test (TUG):

Participants were asked to wear their regular footwear while performing test. They were asked to sit on a chair with back resting on supporting surface of chair. A piece of paper was kept at 3 meters away from chair. Subject was given instruction as "asked to get up, walk, turn, walk and sit back on the chair. Duration was noted from

getting up from chair to sit back on chair. Prior practice session was given before taking final reading.

3) Berg Balance Score (BBS):

This is a standard 5 point scale with 14 items that assesses elderly for their functional balance. Participants were asked to do activities described in scale and were scored as per guidelines.

Procedure:

Detailed plan followed for the study-

1. Consent from the ethics committee
2. Selection of participants according to inclusion criteria, and explanation of procedures.
3. Explanation of the format and details of the intervention.
4. Written consent of participants.
5. Collection of data.
6. Analysis of data-SPSS 16.0 was used. The data was presented as mean \pm standard deviation ($X \pm SD$). Unpaired t test was used for comparison. In all statistics, any p value equals to 0.05 was accepted as statistically significant unless otherwise noted.

Results:

Comparison of scores in male and female group

	AGE	FRT	TUG	BBS
Male	67.28(4.24)	8.59(2.25)	16.64(5.33)	30.53(5.87)
Female	66.74(4.14)	8.61(2.31)	16.54(5.44)	30.56(5.87)
Data normality	Passed	Passed	Passed	Passed
Test used	Unpaired t test	Unpaired t test	Unpaired t test	Unpaired t test
P value	0.14	0.89	0.66	0.95
Inference	Not significant difference	Not significant difference	Not significant difference	Not significant difference

Discussion

Instead of selecting participants who were free from pathologies, we included independently functioning elderly who moved without assistive devices in the community and were independent in all activities at home and community. This criterion seemed to be more realistic. All study participants represented elderly people with few medical comorbidities, were self-reliant in daily activities, and were mobile in the community. Thus, they represented a range of fairly active elderly with good health, in spite of the presence of some pathology. They were comparable on the basis of age thus reducing the effect of age on their balance abilities.

It was observed that both groups performed equally on all balance tests. Finding of this study were in accordance with those of Robin Daly et al where they found same performance on basis of gait velocity in both genders.¹² similar results were observed by Leslie Wolfson et al, who tried to study influence of gender on balance using posturography and found that, there was no difference in static balance abilities when the support surface or visual input were manipulated separately in both genders. They also observed that, balance was affected in women when visual and proprioceptive inputs were changed simultaneously. After their third trial their scores were comparable to men. This means they need practice to develop balance abilities comparable to men. This means with adequate exposure women can perform as good as men on balance tests where vestibular, visual and proprioceptive systems are challenged together.¹³ None of the outcome measures used in this study challenged vestibular, visual and proprioceptive system together thus this effect remains to be studied for future.

Study by A.R Barbosa found that, Brazilian men had better scores for hand grip strength, get up

from chair test, pick up pen test and standing balance tests. They linked these findings with higher percentage of obesity, age and comorbid illnesses present in female participants of their study.¹⁴ Women are generally found to be more prone for obesity, nutritional compromise and comorbidities as compared to men. Although participants in this study were comparable on basis of age, other physical factors like strength, body composition or obesity that can affect balance were not included in this study hence this linking in Indian elderly remains questionable. Since, participants of this study were all community dwelling, any influence of illnesses on their walking abilities can be ruled out.

Barbosa et al also compared motor performance of Brazilian elderly with that of American and Japanese individuals and found that, ethnicity and cultural factors have influence on strength and balance function.¹⁴ Comparing performance of Indian elderly with that of others can be of great help to explore cultural and ethnic influence on balance.

Age and gender related changes in Factors like agility, endurance, strength, reaction time can help to understand the phenomenon of balance affection better. According to study by H. Sugimoto et al, endurance, walking abilities, VO₂ max are higher in males as compared to females.¹⁵ Also, as per observation by Gusi, N et al, Riemann, B.L et al, sitting trunk flexion is generally superior in females compared with that in males.^{16,17} Minami et al. reported that, there was no difference in agility of the total body and fingers in healthy elderly people of both genders.¹⁸ As per study by Kent et al, tapping speed showed an age-related difference but not a gender-related difference.¹⁹ Exploring these factors further will help us understand their influence on balance better.

Extent of regular physical activity and daily functional activities can also influence balance performance. Since this study included individuals who were functionally independent in home and community influence of these factors can be ruled out.

Environmental and behavioural factors may also have a great influence on balance. Since participants of this study were chosen from a

community by convenience sampling, influence of these factors remains questionable.

Longitudinal studies with focus on association between physical composition, motor performance and all the factors mentioned above are recommended to understand linking between different gender performance and balance.

Conclusion:

Gender does not influence balance abilities in healthy community dwelling elderly.

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References:

1. Ingle GK, Nath A; Geriatric Health in India: Concerns and Solutions, Indian Journal of Community Med. 2008; 33: 214–218.
2. Government of India; Morbidity, Health Care and Condition of the Aged; National Sample Survey 60th Round (January to June 2004) March 2006:54–65.
3. Ramamurti PV, Jamuna D; Development and Research on ageing in India. In: Palmore EB, editor. Development and Research on ageing –An International Handbook. West Port: Greenwood Press; 1993.
4. Samson MM, Meeuwse IBAE, Crowe A, Dessens JAG, Duursma SA, Verhaar HJJ; Relationships between physical performance measures, age, height and body weight in healthy adults. Age Ageing. 2000; 29: 235-42.
5. Landers KA, Hunter GR, Wetzstein CJ, Bamman MM, Weinsier RL; The interrelationship among muscle mass, strength and ability to perform physical tasks of daily living in younger and older women. J Gerontol . 2001; 56: 443-8.
6. Stenholm S, Harkanen T, Sainio P, Heliovaara M, Koskinen S; Long-term changes in handgrip strength in men and women—accounting the effect of right censoring due to death. J Gerontol .2012, 67(10):1068–1074
7. Era P, Sainio P, Koskinen S, Haavisto P, Vaara M, Aromaa A: Postural balance in a random sample of 7,979 subjects aged 30 years and over. Gerontology 2006, 52(4):204–213.
8. Callisaya ML, Blizzard L, Schmidt MD, McGinley JL, Srikanth VK; Sex modifies the relationship between age and gait: a population-based study of older adults. J Gerontol . 2008, 63(2):165–170.
9. Shumway-Cook A, Guralnik JM, Phillips CL, Coppin AK, Ciol MA, Bandinelli S, Ferrucci L; Age-associated declines in complex walking task performance: the walking in CHIANTI toolkit. J Am Geriatr Soc. 2007, 55(1):58–65.

10. Lindle RS, Metter EJ, Lynch NA, Fleg JL, Fozard JL, Tobin J, Roy TA, Hurley BF; Age and gender comparisons of muscle strength in 654 women and men aged 20–93 yr. *J Appl Physiol* . 1997, 83(5):1581–1587.
11. McDowell, I. & Newell, C. (1996). *Measuring Health: A Guide to Rating Scales and Questionnaires*. (2nd ed.). New York: Oxford University Press.
12. Daly RM, Ahlborg HG, Ringsberg K, Gardsell P, Sernbo I, Karlsson MK; Association between changes in habitual physical activity and changes in bone density, muscle strength, and functional performance in elderly men and women. *J Am Geriatr Soc*. 2008, 56(12):2252–2260
13. Wolfson L ,Whipple R, Derby CA, Amerman P,Nashner L; Gender Differences in the Balance of Healthy Elderly as Demonstrated by Dynamic Posturography, *J Gerontol*.1994, 49 (4):160-167
14. Barbosa AR, Souza JMP , Lebrão LM , Laurenti R , Marucci MN ;Functional limitations of Brazilian elderly by age and gender differences: data from SABE Survey. *Rio de Janeiro* 2005, 21(4):1177-1185
15. Sugimoto H, Demura S, Nagasawa Y; Age and Gender-Related Differences in Physical Functions of the Elderly Following One-Year Regular Exercise Therapy *Health*. 2014,(6):792-801
16. Gusi, N, Prieto J., Olivares P.R, Delgado S, Quesada F, Cebrián C; Normative Fitness Performance Scores of Community-Dwelling Older Adults in Spain. *Journal of Aging and Physical Activity*.2012, 20:106-126.
17. Riemann BL, DeMont RG, Ryu K, Lephart SM, The Effects of Sex, Joint Angle, and the Gastrocnemius, *J Athl Training*.2001, 36(4):369-375.
18. Minami M, Demura S, Satou S, Kasuga K, Matsuzawa K, Goshi F;The Changing of Physique and Physical Fitness with Age. *Japanese Journal of Physical Fitness and Sports Medicine*.1998, 47, 601-615.
19. Kent-Braun JA,Ng AV; Specific Strength and Voluntary Muscle Activation in Young and Elderly Women and Men. *Journal of Applied Physiology*.1999, 87, 22-29.