Balance Evaluation in Elderly Population

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Abstract

Background: -Balance impairment is common among older population and estimates of its prevalence range between 20 and 50%. Balance is essential for all types of body movement. Impaired balance and increase postural sway both occurs with advancing age. Balance impairment has serious consequence for physical function, fear of fall leads to restriction of several activities. Assessment of balance is important for diagnosis of potential impairment, identifying fall risk, treatment planning and evaluation of changes over time.**Aims**: - To evaluate balance, to analyze encountered problems andto analyze process of implementation.**Method**: - Participants from Sawangi were randomly selected as per inclusion and exclusion criteria(n=100) and balance has been evaluated by using Berg balance scale.Observational cross-sectional study was conducted.Descriptive statistical analysis was done and focused with graphs and tables.**Results**: -Study revealed that out of total individual (100) 91% is at low fall risk, 9 % are at medium fall risk and 0% is at high fall risk. Mean value of fall risk is 50.03. It is also found that out of 49% males, 47 % are at low fall risk and 2 % are at medium fall risk whereas out of 51% female 44 % are at low fall risk and 7% are at medium fall risk.**Conclusion**: - Study concluded statistically significant association, found with age and BBS. It is also found that there is no statistically significant association with gender and BBS.

KEYWORDS: Balance Evaluation, Berg Balance Scale, Elderly Population.

INTRODUCTION:

Balance impairment is common among older population and estimates of its prevalence range between 20 and 50% [1]. In basic terms, loss of balance occurs when the center of mass (COM) falls out of alignment with the base of support (BOS). With about two-thirds of body mass about two-thirds of body height above a relatively narrow BOS,

human bipedal stance and gait are inherently low in stability. Further, the BOS is about halved when standing on one leg, adding to the potential instability. It is therefore not surprising that an elaborate biological substrate has evolved for maintaining or regaining balance. Human beings move about as they perform their activities of daily living and are often exposed to destabilizing environmental forces. As a result, the relationship between the COM and BOS is continually changing, thus requiring that balance be considered in a dynamic context. Rather than collapse when the line of gravity through the COM falls outside the BOS, human beings are able to take corrective action to achieve favorable realignment. Consequently, balance is more appropriately regarded as an activity, instead of as a mere state.[2]

Balance is one of the four components of fitness. Balance is essential for all types of body movement. Maintaining balance encompasses the acts of maintaining, achieving or restoring the body center of mass and relative base of support.[3]Impaired balance and increase postural sway both occurs with advancing age. Balance impairment has serious consequence for physical function, fear of fall leads to restriction of several activities.

Each year one third of elderly people over 65 falls during daily activities and rate becomes higher for people over 75.[4] Accurate quantification of balance deficits allows clinician to determine if their patient is at risk of fall. Evidence demonstrates that clinical measures have ability to capture balance impairment that signifies increased fall risk in community dwelling older patients[5]. The ability to control balance deteriorates with age as result of alteration in vestibular, visual, somatosensory, musculoskeletal and central nervous systems.[6] Unintentional injury, which most often results from falls, is the sixth leading cause of death in people age 65 and older. [7] Falls can be disruptive to the lives of older adults living independently in the community, even when they do not result in injuries severe enough to require medical attention.[8]Assessment of balance is important for diagnosis of potential impairment, identifying fall risk, treatment planning and evaluation of changes over time.[9]

AIM:- The Need of the study/rational is to evaluate balance in Elderly population.
OBJECTIVE: -1. To evaluate balance.

2. To analyze encountered problems.

3. To analyze process of implementation.

METHODOLOGY:-

The institution ethics committee clearance was obtained. 100 participants were selected randomly from Ravi Nair physiotherapy college, AVBRH as per the inclusion and exclusion criteria. The informed consent was obtained. The participants were explained about the type of study in their own language. They had been explained the steps of assessment prior to the test. The participant must understand that they must maintain balance while task performance. Understanding of the task is essential as this may affect the outcome. They were provided with Berg Balance Scale (BBS) activities. This scale is a five point scale ranging from 0-4. '0' indicates the lowest level of function and '4' indicates highest level of function. Total score is 56.

Study design: Observational Cross sectional study.

Sampling technique: Simple random sampling technique.

Study setting: Physiotherapy, Out Patient Department (OPD), Ravi Nair Physiotherapy College (RNPC), Acharya VinobaBhave Rural Hospital (AVBRH) Sawangi (M) Wardha.
Sample size: 100
Study duration: One Year
Inclusion Criteria:
- Above age 60 years
- Both genders

Exclusion Criteria:
- Individuals with diagnosed balance problems
- Individuals with Neurological or musculoskeletal issues
- Individuals with visual deficit
- Individual with hearing deficit

Materials:
1. Berg Balance Scale.
2. Stopwatch.
3. Ruler
4. Standard Chairs (one with arm rest and other without armrest)
5. Footstool or step.
6. 15 feet walkway

Data analysis was done by using descriptive and inferential statistics using Chi-square test and software used in the analysis were SPSS 22.0 version and GraphPad Prism 6.0 version and $p<0.05$ is considered as level of significance.

RESULT:-

Out of total individual (100) 91% are at low fall risk, 9 % are at medium fall risk and 0% are at high fall risk. Mean value of fall risk is 50.03 (SD=6.03).

By using chi-square test statistically significant association found with age and BBS.   [$\chi2$-value is 48.85,p=0.0001,S]

Out of 49% males, 47 % are at low fall risk and 2 % are at medium fall risk whereas out of 51% female 44 % are at low fall risk and 7% are at medium fall risk.

By using chi=square test no statistically significant association found with gender and BBS.[$\chi2$-value is 2.83,p=0.092,NS]

DISCUSSION:-

Out of total individual (100) No of individual in age group 60-69 are 62 (62%), no of individual in age group 70-79 are 24 (24%), no of individual in age group 90-99 is one (1%), Mean age is 68.77 (SD=8.10).Amongst which 49 (49%) are male and 51 (51%) are female.

Assessment is done with Berg Balance Scale (BBS).It consists of 14 parameters of five points ranging from 0 to 4, with 0 indicating lowest level of function and 4 indicates highest level of function. Total score is 56 and it takes approximately 20 minutes to complete. The BBS has excellent internal consistency and good test-retest reliability and requires little specialized training [Shumway-Cook and Woollcott, 2007]

In which first parameter is sitting to standing. Second parameter is standing unsupported. Third parameter is sitting unsupported. Forth parameter is standing to sitting. Fifth parameter is transfers. Sixth parameter is standing with eyes closed. Seventh parameter is standing with feet together. Eighth parameter is reaching forward with outstretched arm. Ninth parameter is turning to look behind. Tenth parameter is turning 360 degrees. Eleventh parameter is placing alternate foot on stool. Twelth parameter is standing with one foot in front. Thirteenth parameter is standing with one foot in front. Fourteenth parameter is standing on one foot.

Total score 0-20 indicates high fall risk, 21-40 indicates medium fall risk, 41-56 indicates low fall risk.

Relation of age and balance: WILLIAM R BERG etal.found that;Younger and older participants were equally likely to fall. Recurrent fallers recorded an average of 2.8 falls per person. The mean ages of fallers and non-fallers were 71.7 years (SD = 6.4) and 72.2 years (SD = 6.9), respectively. Fall rates for individuals in their sixth (n = 38), seventh (n = 46) and eighth (n = 12) decades of life were 55,48 and 58%, respectively, \2 (2, n - 96) = 0.676, P > 0.05.

Sattin RW et al., found that;The rate of fall injury events coming to acute medical attention increases exponentially with age for both elderly male and female.

In our study the fall rate of 50.03% is recorded by our study which is similar to 52% reported by W. P. berg et al.,[8]and closer to 61% reported by Maki etal.,[10]

We found that out of total individual (100) 91% are at low fall risk, 9 % are at medium fall risk and 0% are at high fall risk. Mean value of fall risk is 50.03 (SD=6.03). P=0.001

Relation of gender and balance:

William R Berget al.,found that;The rate at which men (53%) and women (52%) fell was virtually identical, \2 G, « = 96) = 0.008, P > 0.05

Nashner L. et akl., 1994 found that;Women swayed and lost balance more frequently than men. (N=234, mean age = 76+/-5 years, 52% female.

Sattin RW, Lambert-Huber DW, Devito CA, Rodriguez JG, Ros A, Bacchelli S et al. 1990 in their study found; Comparing average rate of fall amongst elderly male and female, the rate of fall injury amongst female are more.

(138.5 per 1,000 for males and 158.5 per 1,000 for females).

Several previous studies had reported higher fall rate amongst male [11, 12]but in our study percentage of fall amongst female is more which is similar as reported by Wolfson L et al., J A Stevens et al.,andSattin RW et al., [13-15]

Out of 49% males, 47 % are at low fall risk and 2 % are at medium fall risk whereas out of 51% female 44 % are at low fall risk and 7% are at medium fall risk.[χ^2-value is 2.83,p=0.092,NS]

Analysis of Berg Balance Scale: (Parameterwise)

Kornetti et al.,and Fritz SL et al., in their study found that;

Functional indicators of score of at least 45/56 were a rating of passing the item "tandem stance" as well as passing two of following 3 items "alternate foot", "standing on one leg", "and look behind."[16]

In our study82% of individual are able to perform parameter 10 (turning to look behind) with highest score 4.Very few no of individual (21%) are able to perform parameter 11 (turning 360 degrees) with highest score 4.Parameter 1 (sitting to standing) and parameter 14 (standing on one foot)with highest score 4 are also somewhat difficult for elderly individuals.

 CONCLUSION:

- Statistically significant association was found with age and BBS.
- It is also found that there is no statistically significant association with gender and BBS.

 REFERENCE:

1. Rubenstein LZ, Josephson KR. The epidemiology of falls and syncope.ClinGeriatr Med. 2002; 18:141–158. [PubMed: 12180240]

 2. Maki BE, McIlroy WE. The role of limb movements in maintaining upright stance: the "change-in- support" strategy. Phys Ther. 1997; 77:488–507. [PubMed: 9149760]

3. Alexander 1994; Pollock et al; 2000 (Postural control in older adults J.Am.geriat.soc.1994; 42:93-103(pubmed)

4. Falls prevention facts (web.2015)

5. Muir Sw, Berg, Chesworth B (quantifying the magnitude of risk for balance impairement on falls in communicating dwelling older adults)epidemol 2010;63(4):389-406

6. E.G.da Silva Borger, Borger, R.G. de Souza Vale (Postural Balance and falls in elderly nursing home, residents enrolled in ballroom dancing program, Archieves of gerontology & geriatrics vol 59 no.2 pp 312-316)

7.Sattin RW. Falls among older persons: a public health perspective.Annu Rev Public Health 1992; 13: 489-508.

8.William r berg, Helaine m. alessio, Eugenia m. mills', Chen tong2 (department of Physical Education, Heafth and Sport Studies, Miami University, 109 Phillips Hall, Oxford, OH 45056, USA 'Department of Nursing, Miami University, Oxford, OH, USA 2Scripps Gerontology Center, Miami University, Oxford, OH, USA)

9. Guide to Physical Therapist Practice. Phys Ther. 2nded 2001; 81:9-746 [https://www.ncbi.nih.gov/pubmed/9184689]

10. Maki BE, Holliday PJ, Topper AK. A prospective study of postural balance and risk of falling in an ambulatory and independent elderly population. J Gerontol Med Sci 1994; 49: M72-84.

11. Hausdorff JM, Rios DA, Edelber HK. Gait variability and fall risk in community living older adults : A 1- year prospective study. Arch Phys Med Rehabil. 2001;82(8):1050-1056.

12. Catherine R. Gale, Cyrus Cooper, (Age and aging, Vol. 45, Issue 6, 2 November 2016, Pages 789-794)

13.Wolfson L, Whipple R, Derby CA, Amerman P, Nashner L. et akl., 1994

14. J A Stevens, E D Sogolow(Gender difference for non fatal unintentional fall related injuries among older adults)

15. Sattin RW, Lambert-Huber DW, Devito CA, Rodriguez JG, Ros A, Bacchelli S et al. 1990

16. Kornetti DL, Fritz SL, Chiu YP, Light KE, Velozo CA (2004) Rating scale analysis of the Berg Balance Scale. Arch Phys Med Rehabil 85: 1128-1135.