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ORIGINAL ARTICLES

EFFICACY OF BERG BALANCE SCALE (BBS) TO PREDICT FALLS IN ELDERLY INDIVIDUALS

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Abstract -

Background : If a senior falls and is injured, his or her ability to live independently decreases. Even a fall that does not cause an injury can limit self confidence and ability to be comfortable living independently. Balance is one of the important factors contributing towards upright posture. This study is aimed to find out if there exists any correlation between Activity specific Balance confidence scale which assesses confidence and Berg Balance Scale which determines the ability of the individual to balance himself.

Method : Observational study conducted at physiotherapy teaching institute. There were 110 elderly indivuals included in the study by random sampling technique. Individuals with age group 60-80 years & those who are functionally independent were included in the study. Further individuals having independent standing minimum for five minutes& indivuals with intact ability to understand the commands were included in the study. Subjects with known neurological disorder& acute musculoskeletal disorder were excluded from the study. Test items were performed by subject and score on ABC Scale and Berg Balance Scale were calculated for all subjects after giving detailed information about the tool and their use in the language they understand.

RESULT : There is a significant negative correlation between BBS & ABC (r= -0. 248) & P Value 0.74 **Conclusion :** from the results of the study it can be concluded that ABC is effective in predicting falls in elderly individuals.

Key words : Berg Balance Scale, Activity- specific Caution scale.

Introduction -

By the year 2050, approximately 20% of the world's population will be older than 65 years. The world population is aging. Increased life expectancy and decreased death rate have contributed to rapid rise in number and proportion of persons aged 65 years and older. India is the second most populous country in the world and has 76.6 million people over age of 60 constituting above 7.7% of total population.[1]

The leading causes of injury-related mortality and morbidity among elderly are falls which is a common and potentially preventable problem.[2] In united states, nearly one third of older adults experiences a fall. In 2003 more than 13,700 people, 65 years or older died of fall related injuries. Another 1.8 million were treated in emergency dept. for non fatal injuries related to fall (NCIPC2006). In multi-centric community study, evaluating Health Problems in the elderly (Year 2003), in states across India, covering a total population of 10,000 elderly with equal rural and urban distribution , the incidence of falls (history of single fall in the last 6 months) was found to be 14%.[3]

If a senior falls and is injured, his or her ability to live independently decreases. Even a fall that does not cause an injury can limit self confidence and ability to be comfortable living independently. In US among non institutionalized persons 65 years and older approximately 13% have difficulty in performing activities of daily living. Approximately 9% have difficulty with bathing, 8% have difficulty with walking and 6% have difficulty with bed or chair transfer. The rate at which these problems occur increases progressively after age 65 and climb sharply after age 80.[3]

The evaluation of multifactorial cause of fall can be simplified by examining internal and external factors. Internal (personal) risk factors include cardiovascular, neurovascular, orthopedic, perceptual and psychiatric or cognitive impairments.

External (environmental) risk factors includes medications appliances, assistive devices, environmental hazards and level of care.[3]

Balance is a multidimensional process and is the result of interactions between the individual, the task and the environment (Anne Shumway-Cook). Balance is the ability to maintain the body's center of mass over its base of support (Shumway-Cook & Woollacott, 2001). A comprehensive balance assessment is an integral part of the initial evaluation and should be undertaken when a balance deficit is suspected.

The balance assessment includes subjective assessment, functional mobility and gait assessment, musculoskeletal evaluation and assessment of movement strategies and sensory systems used for balance (Shumway-Cook & Woollacott, 2001).[3]

There are various reliable assessment tools available for the evaluation of functional mobility and gait tasks. A functional mobility assessment quantifies mobility skills, testing the ability of your client to perform specific daily tasks such as gait, sit to stand, turning, reaching, retrieving an item from the floor, turning 360 degrees, transfers, & stair climbing. The tests are designed to provide a framework for the assessment of functional mobility; they only generally predict the risk of falls but do not fully identify the underlying cause of the balance impairment. Functional mobility tests include the Berg Balance Test(K.Berg et ,al 1989), the Functional Reach Test (P.Duncan et al 1990), the Get Up and Go Test (Mathies et. al 18600) & the performance Oriented Mobility Assessment (POMA) (Tinetti 1986)[3] Activity –Specific Caution scale(AFC)[4] & The Fullertion Advance Balance Scale (FAB). [5] The Morse Fall Scale, STRATIFY that is St Thomas Risk Assessment Tool in Falling Elderly Inpatients,& Hendrich II Fall Risk Model are used to assess the fall.[6]

The Berg Balance Test was developed by Katherine Berg in 1989 and is a widely-used test of functional mobility and balance—especially with the ambulatory elderly. The Berg test is intended to objectively evaluate a client's ability to safely perform several common daily living tasks and to assess fall risk. It is scored on a scale of 0 to 56, based on the client's ability to perform fourteen mobility tasks. Berg test gives good general impression regarding fall risk and good inter-rater reliability. Berg test is a good indicator of fall risk in older adults living in the comunity (Shumway-Cook & Woollacott, 2001).

High score on the Berg test indicates a low risk of falling and a low score indicates a high risk of falling. As the Berg score declines, fall risk increases nonlinearly, with scores below 36 of 56 showing a fall risk of almost 100% (Shumway-Cook & Woollacott, 2001).[3] Berg Balance Scale was chosen as a part of this study, because it takes approximately 20 minutes to complete and requires no sophisticated equipment, making it useful in clinical settings.[7] Measurements obtained with this test have demonstrated excellent interrater reliability and tendency toward at least moderately strong concurrent validity.[3]

ABC scale has been used in variety of populations. Several risk factors associated with falls in hospitalized patient have been identified. A substantial number of assessment instruments for identifying hospitalised patient at risk of falling exists but their generalisability is limited because few have been tested in settings other than those in which they were originally developed. MFS appears to be most elaborate in view of it's extensive development and testing in different hospital population compared with others. MFS developed in 1985 by Morse JM. It contain 6 items and if there is risk factor it is rated as 'Yes' or 'no'. Total score of scale is 125. Based on total score; individuals are categorized as high medium or low risk of falling.[8] The Activities-specific and Balance Confidence (ABC) Scale is a questionnaire developed to measure an aspect of the psychological impact of balance impairment and/or falls. The underlying construct being measured by the ABC scale is based on the self efficacy theory reported by Tinetti et al (1990).[9]

Hence this study aimed at correlating the total score of both the scales i.e. Activity specific Balance confidence Scale and Berg Balance Scale.

Methodology - The study design was an observational study with the main objective of exploring a correlation between ABC scale & BBS. Prior to beginning the study ethical committee consent was obtained.

The inclusion criteria were individuals with age group 60-80 years, both male and female individuals, functionally independent, having independent standing minimum for five minutes, with intact ability to understand the Commands. The exclusion criteria was any known neurological disorder & with acute musculoskeletal disorder. The study was conducted at Physiotherapy Department of Sawangi (Meghe) Wardha. A total of 110 subjects were included in the study.

Informed consent obtained from subjects. They were informed about the use of the study in detail and also the test procedure to be performed as a part of study. It was assured that study will not cause any harm to them in any aspect.

This was followed by assessing the balance of each individual with the help of Berg Balance Scale. BBS contained 14 items. (figure no.1) Each Item has score 0- 4; and total score is 56. Then MFS application has score of 125. Application of both the scale took 20-25minuts.The materials used were stop watch, ruler, inch tape, two chairs, foot stool.

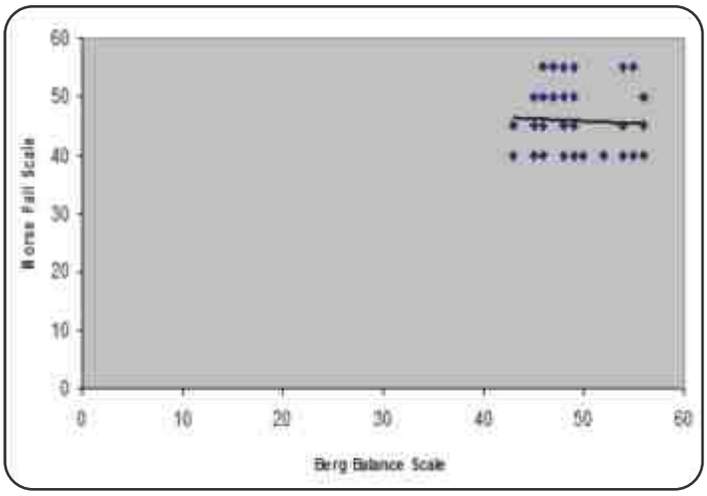
After assessing the score correlation was done.

DATA ANALYSIS AND GRPAHICAL REPRESENTATION

Table 1: Correlation of Berg Balance Scale and ABC Scale in diabetes, hypertension, diabetes + hypertension and in general patients.

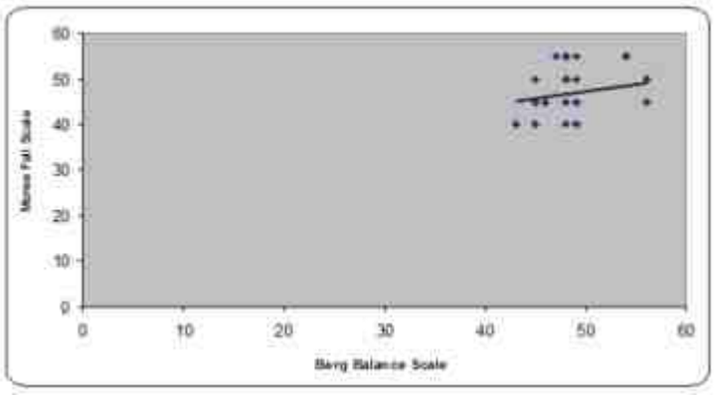
Secondary Diagnosis	Scale	Mean	Std. Deviation	n	Correlation 'r'	p-value
Diabetes	Berg Balance Scale ABC scale	48.52 46.91	2.61 5.77	34 34	-0.41	0.04 S,p<0.05
Hypertension	Berg Balance Scale ABC scale	48.85 45.71	3.59 5.83	14 14	0.42	0.03 S,p<0.05
Diabetes + Hypertension	Berg Balance Scale ABC scale	52.50 42.50	4.9 43.53	2 2	1.00	0.00 S,p<0.05
In general	Berg Balance Scale ABC scale	48.26 45.50	2.67 6.08	50 50	-0.35	0.007 S,p<0.05

Graph 1: Correlation between Berg Balance Scale and ABC Scale

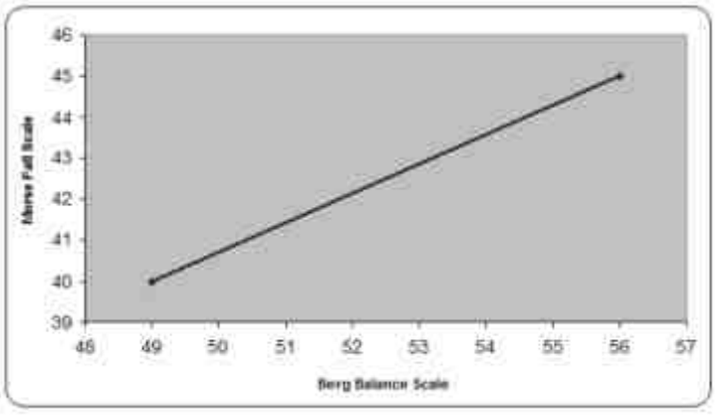


Graph 2: Correlation of Berg Balance Scale & ABC Scale in diabetes, hypertension, diabetes +hypertension and in general patients.

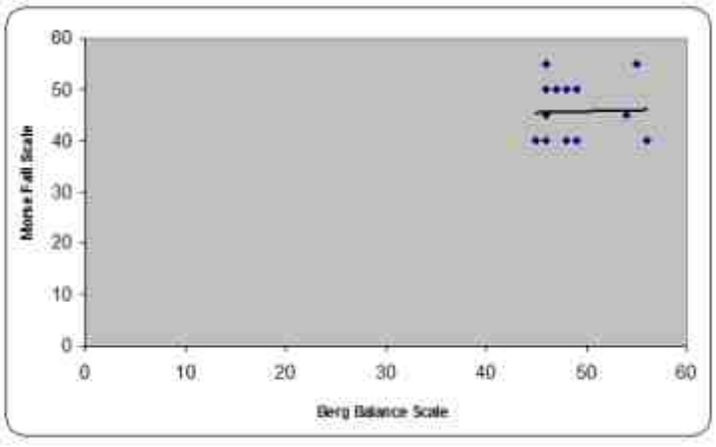
2. A. Diabetes



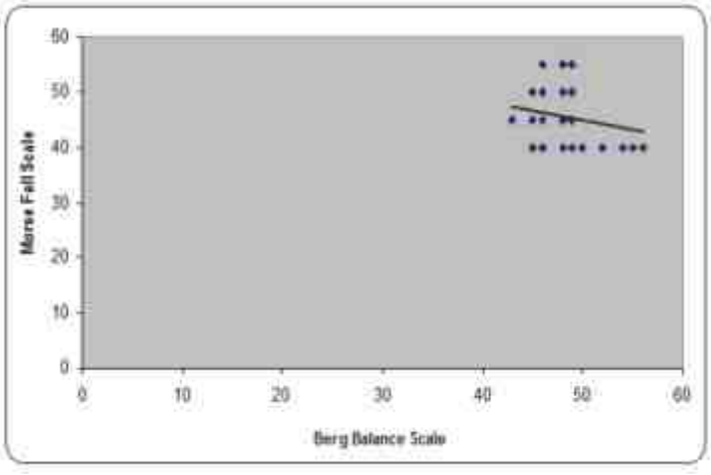
2. B. Diabetes + Hypertension



2.C. Hypertension



2. D. In General



Result -The study was done to explore correlation between BBS & ABC scale in elderly people. BBS & ABC of 110 patients as per inclusion & exclusion criteria was collected. The mean of BBS is 48.352 while that of ABC is 45.95. Standard deviation of BBS & ABC is 2.85 & 5.89 respectively.

There is negative correlation of -0.248 between BBS & ABC P value is 0.01 (S.P <0.05(hence it is significant). In our study we also evaluate correlation between the BBS & ABC in diabetes and hypertension in normal individual. The correlation of BBS &ABC in Diabetes patient is -0.41 & P value 0.04 (S,P <0.05). Along with that there is also a significant correlation.In subjects with hypertension the correlation between BBS & ABC is -0.42 & P value 0.03 (S,P <0.03). Mean correlation is significant. There was a significant result for correlation between BBS & ABC in DM + HT patient with negative correlation -1.00 & P Value 0.00 (S, P < 0.05) In general correlation between BBS & ABC is 0.35 & P Value 0.07 (S,P <0.05), hence it is significant.

Fig no.1 : Assessment of balance

Discussion -

In the present study 110, elderly individuals were assessed between age group of 60-80 years. Out of that 72% & 28% subjects were of age group 60-70 years and 71-80 years respectively. In age group of 60-70 years 45% were males & 27% were females. In age group of 71-80 years 19% were males & 9% were females. In this study, we have used Berg Balance scale for assessing individuals. It includes 14 items graded from 0 - 4 grading & Maximum score is 56. Interpretation of score of BBS less than 20 is Wheelchair bound, 21-40 -: Walking with assistance 41-56-:Independent walking.[10]

Though 41-56 considers that patient can walk independently, there are chances of mild balance impairment which might go unnoticed, resulting in fall13. Another scale i.e. ABC used, was initially designed to identify patient at risk of falling in elderly individuals. Total score of ABC is 125, it contains 6 items and each item has different score. Interpretation or cut off score of ABC is of 45. If score is more than that it indicates that patient at risk of fall.[6] In the present study the mean of BBS & ABC was 48.52 & 45.95 respectively. Correlation between both the scales was -0.248 & P value was 0.01 (S, P >0.05) according to this, correlation is negative i.e. As the score of BBS increases. ABC score decreases (BBS α 1/ ABC). Hence above data predicts, the study is significant by using t-test for testing significance of correlation & SPSS 14.0 (Statistical package for social sciences) [12,13]

Elderly people with diabetes & Hypertension has impaired balance resulting in fall. Dr. Maurer Speculates that problem with peripheral nerves that can affect the sensation in Diabetic people's Feet (Peripheral Neuropathy) could be mechanism for higher fall rate in diabetic patients.[14] In our study the prevalence of Diabetes has come 34% which is quite higher than study made by Vijay Gupta probably is due to our small sample size & inclusion of different age groups.[15] The correlation between BBS & MFS in diabetes is -0.41 & P value 0.04 (S,P > 0.05). These values provide a significant record to our study.

Impairment of balance in subjects with HT is due to

1. Impairment of neural control system regulating BP.
2. Chronic HT causing micro vascular changes.
3. Hypertension leading to poor cerebral perfusion.[16]

Accordingly the prevalence of our study comes to be 14% which is similar with study work done by medical research center Bombay Hospital Trust Mumbai, Prevalence rate of HT is 12.5% (70-80 years).[17] The correlation between BBS &ABC in HT is -0.42 & P value 0.03 (S, P > 0.05). There is a significant correlation between BBS and ABC in patients with Hypertension.

Prevalence of balance impairment in subjects with both DM & HT is found to be 2%. It is approximately similar with the study made by Shrestha D. L. Singh.[18] In our study the correlation in DM & HT in same individual is -1.00 & P value is 0.00 (S, P <0.05). So if individual has combined DM and HT, there is greater risk of fall.

From the present study it is concluded that there is negative correlation between BBS & ABC which is statistically significant & it suggests that BBS is efficient tool for predicting falls in elderly individuals.

Conclusion -

Thus it is concluded that there is negative correlation between BBS & ABC which is statistically significant & it suggests that BBS is efficient tool for predicting falls in elderly individuals.

Conflict of Interest -

Authors reports no conflict of interest.

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None

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