INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Prediction of falls in elderly: Correlation of Berg's balance scale with turn 180 test

Keerthika Veer Ranji[1], Sam Thamburaj A[*2], Joseph Oliver Raj[2], Syed Zubair Ahmed[3], Arul B[4]

[1]Department of Physiotherapy, Alvas College of Physiotherapy, Moodbidri, Karnataka, India
[2]Department of Physiotherapy, Vinayaka Mission's College of Physiotherapy, Vinayaka Mission's Research Foundation (Deemed to be University), Salem-636308, Tamilnadu, India
[3]Department of Physiotherapy, Nanded Physiotherapy College and Research Center, Nanded, Maharashtra, India
[4]Department of Pharmacy Practice, Vinayaka Mission's College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed to be University), Salem-636308, Tamilnadu, India

ABSTRACT

Falls are a significant cause of morbidity and mortality among the elderly population. In an already overburdened health care system, quick assessment tools can save much time and effort. Assessment of balance is a vital part of geriatric assessment. Due to time constraints in busy clinical settings, there is a need for a rapid balance assessment test. This can be used to screen all elderly patients, following which the detailed Bergs Balance Scale can be used. The study was aimed to correlate the findings of the Bergs Balance Scale with Turn 180 test. A cross-sectional study was conducted consisting of a sample size of 30 subjects in the age group between 60 to 80 years who visited the outpatient department of Alva's college of physiotherapy. The researcher conducted an interview followed by administration of the Bergs Balance Scale and the Turn 180 test. The scores were recorded and subjected to statistical analysis. Statistical analysis using the Pearson coefficient of correlation revealed that there is a statistically significant correlation between Bergs Balance Scale and turn 180 test. Thus turn 180 test can be used for a quick assessment of balance, and those who score low should be subjected to the Berg's Balance Scale. Fear of falls significantly contributes to falls in the elderly, especially in the high-risk category apart from other causes.

*Corresponding Author

Name: Sam Thamburaj A
Phone: 9003598038
Email: samsy4@gmail.com

INTRODUCTION

Worldwide, the proportion of the elderly population is increasing with every passing day. As a result of scientific and technological advances, many people live beyond the sixties—a significant health concern for the elderly falls (Muir *et al.*, 2008). A fall is defined as an event resulting in a person coming to rest unintentionally on the ground or other lower level, not as a result of a major intrinsic event (such as stroke) or overwhelming hazard (Tinetti *et al.*, 1988). Statistical estimates indicate that 33% of people over 65 experience falls (Tinetti, 2003). This not only creates a significant burden on the healthcare system but is also a serious public health

issue. Falls among elderly persons have a multifactorial aetiology, and considerable research has been devoted to determining the variables that correlate with the incidence and severity of falls (Nevitt, 1989; Rubenstein and Josephson, 2002). Both intrinsic and extrinsic risk factors contribute to falls in the elderly. The intrinsic factors include age, history of falls, solitary lifestyle, race, medical conditions, drugs, deconditioning due to impaired mobility and gait, nutritional deficiencies, cognitive disorders, visual impairments and foot problems (Dionyssiotis, 2012). The extrinsic risk factors constitute environmental causes (poor lighting, slippery floors, misstep, tripping, etc.) (Dionyssiotis, 2012).

A combination of risk factors causes a majority of the falls. A key factor for falls in the elderly is an impairment of balance (Muir *et al.*, 2008). Though an impaired balance is not always a clinical finding in all the elderly nor is it a sufficient cause for fall, it creates a manifold increase in the risk for falls (Muir *et al.*, 2008).

This makes balance assessment an essential component of geriatric assessment. Though there are several tests to assess balance; administering the elaborate components of these tests in a busy clinical setting is time-consuming. Thus, we conducted this study to determine if the turn 180 test can be used for a quick assessment of balance followed if required by the Berg's balance scale.
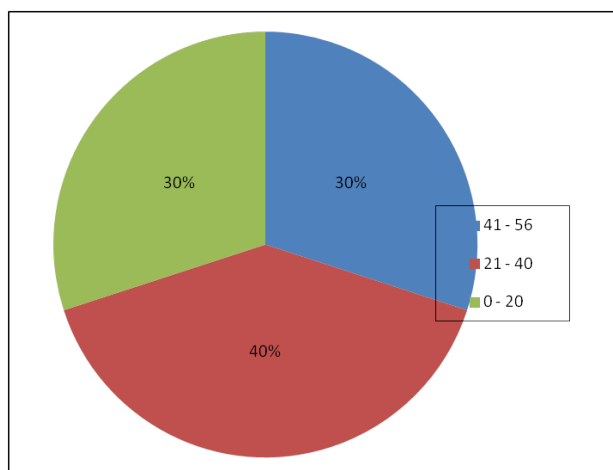

Figure 1: BBS score of the patients

MATERIALS AND METHODS

Sample size

A total of 30 subjects participated in the study.

Inclusion criteria

1. Elderly population between 60 to 80 years of age

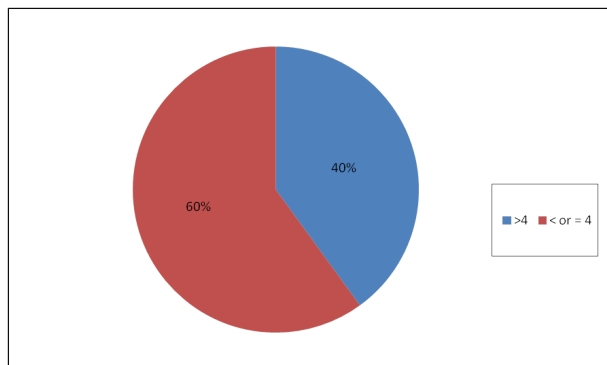2. who have comorbidities, previous history of falls

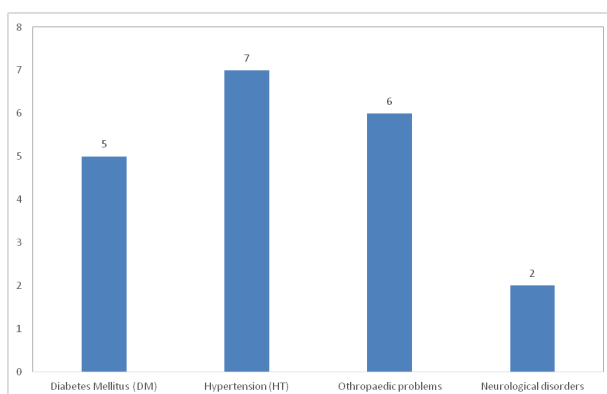Figure 2: Results of scores of Turn 180 test.

Figure 3: Co morbid factors in high risk subjects

Exclusion criteria

1. Subjects unwilling to participate in the study due to reasons not stated by them.

2. Subjects unable to perform the Berg's Balance Scale or Turn 180 Test due to any reason

Materials used for the study

1. Step stool

2. Chair with armrest,

3. Measure tape

4. Stopwatch

5. Recording sheets

Procedure

This study was carried out under Alva's Education Foundation, and ethical clearance was obtained from Alva's College of Physiotherapy. Elderly patients who visited the Out-patient department of Alva's College of Physiotherapy and satisfied the inclusion criteria were included in the study. Prior informed consent was obtained from participating subjects. The participants were assured that the data would be kept confidential, and the nature of the study was explained. Adequate care was taken to avoid any bias. The initial interview was conducted by the researcher in English using a self-administered assessment questionnaire to obtain

the demographic data, medical history and fall history of the participating subjects.

The Berg's balance scale consisting of fourteen functional subtests was administered, and the total score the participant secured out of 56, was obtained. The BBS (Berg's balance scale) assesses both static and dynamic balance. The tasks performed by the participants consist of a range of functional activities such as reaching out, bending etc. It takes about 20 minutes for the administration of the components of the BBS. Each item is given a score ranging from zero to four where zero indicates an inability to complete the task, and four indicates independent completion of the item. Thus, the total score secured by the participant out of 56 is obtained (Blum and Korner-Bitensky, 2008). The subjects were classified as having a high, moderate or low risk of falls depending upon their score on the Berg's Balance Scale as follows (Lysack, 2010).

41 to 56 - low fall risk

21 to 40 - medium fall risk

0 to 20 - high fall risk

This was followed by administration of the Turn 180 test in the same session. The participants were given a rest interval of 30 minutes between the two tests to avoid fatigue. The Turn 180 test is highly useful to assess dynamic balance in the elderly population. For the Turn 180 test, the participants were asked to turn 180 degrees from their dominant side. Steady supports and handholds were placed around, and participants were asked to use them if they felt unsteady (Simpson *et al.*, 2002). The number of steps taken by the subjects to complete the Turn 180 Test was noted. The subjects were classified as having a high or low risk of falls depending upon the number of steps they took to complete the 180-degree turn as follows (Simpson *et al.*, 2002).

> 4 - high risk for fall

< or = 4 - low risk for fall

The data were then subjected to analysis.

Data analysis

Analysis of the data was performed based on the score that participants secured on BBS and turn 180 test. The Pearson coefficient of correlation was used to determine the correlation between Berg's Balance Scale with Turn 180 Test.

RESULTS AND DISCUSSION

The cross-sectional study was conducted consisting of a sample size of 30 subjects in the age group between 60 to 80 years who visited the out-

patient department of Alva's college of physiotherapy. The researcher conducted an interview followed by administration of the Bergs Balance Scale and the Turn 180 test. Pearson's correlation coefficient was used to find the correlation of Berg's Balance Scale with Turn 180 Test.

The scores of the BBS was used to classify the subjects as having low, medium or high risk of fall according to the criteria mentioned. The patients falling into the category of low fall risk, medium fall risk and high fall risk was found to be 30% (n=9), 40% (n=12) and 30% (n=9) , respectively. The details are shown in Figure 1.

Turn 180 test

The number of steps taken by subjects to complete the 180-degree turn from the dominant side was counted, and the results are shown in Figure 2. It shows 40 % (n=12) of the subjects have a high risk for falls, and 60 % (n=60%) are in the low-risk category.

Analysis of the high-risk group for the presence of co-morbid factors

The analysis of the data from the questionnaire of subjects falling in the high-risk category as per both the BBS and Turn 180 test was done to detect the presence of the co-morbid conditions diabetes mellitus, hypertension, orthopaedic and neurological problems. The results are shown in Figure 3 and the number of patients in each category of co morbidities is 5,6,7 and 2 respectively.

Analysis of high-risk group for the presence of fear of falls and history of falls

The presence of these two factors in the high-risk group was analysed based on the information obtained from the questionnaire. It was found that all the subjects in the high-risk category showed the presence of fear of falls. Few of them had a previous history of falls.

Correlation of Berg's Balance Scale with Turn 180 Test

Correlation between Berg's Balance scale and Turn 180 Test was done using the Pearson Correlation Coefficient.

The two-tailed P-value is < 0.0001

Therefore, the test is extremely significant.

An impaired balance is a physiological cause for a fall. Thus, balance assessment forms an essential part of a comprehensive geriatric assessment (Welsh *et al.*, 2014). The evaluation of balance and prediction of "who is at high risk for falls "can help in preventing falls.

My study aimed to find if there exists a correlation between Berg's Balance Scale and Turn 180 test in assessing balance and thus predicting falls in the geriatric population. Balance in the elderly was evaluated in this study using the BBS and Turn 180 test. Both of these assessment tools are reliable and valid indicators of impaired balance (Gamerman *et al.*, 2019; Godi *et al.*, 2013; Simpson *et al.*, 2002). The BBS provides an objective assessment and assesses both static and dynamic postural stability. The Turn 180 test is designed primarily to assess dynamic stability.

Analysis using the BBS showed that a more significant proportion of the subjects had a moderate risk of fall whereas 30 % are in low and high risk for falls. The findings of the Turn 180 test reveal that 40 % of the subjects have a high risk for falls and 60 % fall in the low-risk category. Further analysis of the high-risk category showed that the presence of hypertension, orthopaedic problems increases their risk of falls. These two ailments are very common in the elderly population. Fear of falls was present in all the individuals of the high-risk group though only a few of them had the previous history of falls.

Falls in the elderly have a multifactorial aetiology, and many a time, the risk factors are identifiable and correctable (Dionyssiotis, 2012). Once identified by health care workers, appropriate treatment strategies can be implemented to prevent falls (Lee *et al.*, 2013). An essential component of fall prevention is the administration of balance and strength training and also focus on overall mobility and psychosocial well-being of the elderly (Gschwind *et al.*, 2013). This would enable the elderly to maintain good mobility which is extremely important to be independent in activities of daily living (Frank, 2003). However, there are many constraints faced by the physical therapist, which make balance assessment and prediction of fall risk difficult. A significant factor is the lack of time and resources to administer elaborate balance assessment tests (Jang *et al.*, 2017). This study shows that there is a significant correlation between the BBS and Turn 180 test. As the Turn 180 test provides a quick assessment of balance, it can be used with much ease in busy clinical settings for an initial evaluation of stability. The patients falling in the high-risk category can then be subjected to the BBS for a detailed assessment of balance.

CONCLUSIONS

From this study, we conclude that the Turn 180 test can be used in busy clinical settings for quick assessment of balance followed by administration of BBS.

Also, cognisance must be given to the presence of fear of falls and the presence of comorbidities as they are essential factors that can predict and cause falls in the elderly.

Conflict Of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

Blum, L., Korner-Bitensky, N. 2008. The usefulness of the Berg Balance Scale in stroke rehabilitation: a systematic review. *Physical therapy*, 88(5):559–566.

Dionyssiotis, Y. 2012. Analyzing the problem of falls among older people. *International Journal of General Medicine*, 5:805.

Frank, J. 2003. Balance and mobility challenges in older adultsImplications for preserving community mobility. *American Journal of Preventive Medicine*, 25(3):157–163.

Gamerman, Y., Hoshen, M., Herman, A. C., Alter, Z., Hadad, L., Melzer, I. 2019. Validity and Interobserver Reliability of the Turn 180 Test to Identify Older Adults Who Reported Falls. *The Israel Medical Association journal: IMAJ*, 21(4):269–274.

Godi, M., Franchignoni, F., Caligari, M., Giordano, A., Turcato, A. M., Nardone, A. 2013. Comparison of Reliability, Validity, and Responsiveness of the Mini-BestTest and Berg Balance Scale in Patients With Balance Disorders. *Physical Therapy*, 93(2):158–167.

Gschwind, Y. J., Kressig, R. W., Lacroix, A., Muehlbauer, T., Pfenninger, B., Granacher, U. 2013. A best practice fall prevention exercise program to improve balance, strength / power, and psychosocial health in older adults: study protocol for a randomized controlled trial. *BMC Geriatrics*, 13(1):105.

Jang, H. Y., Kim, Y. L., Oh, J. L., Lee, S. M. 2017. Barriers to Using Balance and Gait Assessment Tools by Physical Therapists in Patients with Neurological Impairments: A Systematic Review. *Journal of*

Clinical Research and Bioethics, 8:1–6.

Lee, A., Lee, K. W., Khang, P. 2013. Preventing falls in the geriatric population. *The Permanente Journal*, 17(4).

Lysack, C. L. 2010. Household and neighbourhood safety, mobility. *Handbook of Assessment in Clinical Gerontology*, pages 619–646.

Muir, S. W., Berg, K., Chesworth, B., Speechley, M. 2008. Use of the Berg Balance Scale for Predicting Multiple Falls in Community-Dwelling Elderly People: A Prospective Study. *Physical Therapy*, 88(4):449–459.

Nevitt, M. C. 1989. Risk Factors for Recurrent Non-syncopal Falls. *JAMA*, 261(18):2663.

Rubenstein, L. Z., Josephson, K. R. 2002. The epidemiology of falls and syncope. *Clinics in Geriatric Medicine*, 18(2):141–158.

Simpson, J. M., Worsfold, C., Reilly, E., Nye, N. 2002. A standard procedure for using Turn180: testing dynamic postural stability among older adults. *Physiotherapy*, 88(6):342–353.

Tinetti, M. E. 2003. Preventing Falls in Elderly Persons. *New England Journal of Medicine*, 348(1):42–49.

Tinetti, M. E., Speechley, M., Ginter, S. F. 1988. Risk Factors for Falls among Elderly Persons Living in the Community. *New England Journal of Medicine*, 319(26):1701–1707.

Welsh, T. J., Gordon, A. L., Gladman, J. R. 2014. Comprehensive geriatric assessment - a guide for the non-specialist. *International Journal of Clinical Practice*, 68(3):290–293.