



RESEARCH ARTICLE

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COMPARISON OF THE GOAL ATTAINMENT SCALE AND THE BERG BALANCE SCALE FOR ASSESSING BALANCE IMPAIRMENT PEOPLE WITH ACUTE RIGHT SIDE STROKE: VALIDATION STUDY

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ABSTRACT

Objectives: Comparison of the Goal attainment scale and the Berg Balance Scale for Assessing Balance impairment People With acute right side stroke Design: A Validation study, Physiotherapy and rehabilitation centre. **Subjects:** This study was carried out with 7 patients of age between 40-70 years who had acute right side stroke. **Intervention:** Score was evaluated using Goal Attainment scale (VAS), and Score was evaluated by Berg Balance Scale which was recorded at base line and at the end of week. Outcomes: Balance control and impairment was evaluated using Goal Attainment Scale and Berg Balance Scale in acute right side stroke patients who were recorded at the base line and at the end of fifth day. **Results:** Both the Goal Attainment Scale and Berg Balance Scale showed significant improvement score in acute middle cerebral artery stroke patients. Conclusion: Goal Attainment Scale is a better scale to assess balance impairment in acute middle cerebral artery stroke patients.

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INTRODUCTION

The WHO has used a standard criterion to define Stroke as rapidly developing clinical signs of focal (at times global) disturbance of cerebral blood function, with symptoms lasting for 24 hours or longer or leading to death, with no apparent cause other than of vascular origin. In stroke patient they have several impairments that include (cognitive impairment, postural impairment, balance impairment). In acute stroke the patient loses there balance control over the body. Balance impairments in steadiness, symmetry and dynamic stability are commonly affected in stroke patients. Goal attainment scale was first developed by Kirusek and Serman in 1968. It is a method of scoring the extent to which patient's individual goals are achieved in the course of intervention. In effect, each patient has their own outcome measure but this is scored in a standardised way as to allow statistical analysis. Outcome measures are used to indicate the process of documentation of client improvement and achievement of treatment goals. Berg Balance scale was developed by Katherine Berg in 1989.

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It is widely used clinical tests of a person static and dynamic balance abilities. It was developed to measure balance among older people with impairment in balance function by assessing the performance of functional tasks. It is a valid instrument used for evaluation of the effectiveness of interventions and for quantitative descriptions of function in clinical practice and research. The scale should be easy to interpret evaluate and precise. So that the scores are easy to evaluate statistically. Feasibility of the scale and its intrarater and interrater reliability marks the scale an efficient source of evaluation.

AIM

The purpose of the study was to compare the feasibility of Goal Attainment Scale and Berg Balance Scale to assess the balance impairment among acute middle cerebral artery stroke patients.

MATERIALS AND METHODS

A prospective study, was conducted between February 2019 and March 2019 in an outpatient department, Physiotherapy and Rehabilitation Center , Al ahsa , Saudi Arabia. Patients

were referred by Neurology department and also self-referral to the centre. Patients were included if they were between 40 to 70 years of age and had been diagnosed with acute middle cerebral artery stroke patients with in onset of one week, males.

Inclusion Criteria

- Middle Cerebral Artery infarct with hemiparesis
- Patients with post stroke with in onset of one week
- Males
- Age:40-70 years
- Patient able to sit with support of their hands on bed

Exclusion criteria

- Hemorrhagic stroke
- Cognitive and perceptual disorders
- Visual and auditory impairments

Assessment of goal attainment scale and berg balance scale: Pre assessment and post assessment were taken first and fifth day of therapy. Routine patient progression was also taken.15 to 20 minutes was taken to complete the assessment of each scale.

Procedure for Goal Attainment Scoring

1. Identify the goals: Patient to identify the main problem relating to balance and impairment. Establish an agreed set of priority goal areas for achievement. Set goals should follow the SMART principle,they should be S-Specific, M-Measurable, A-Attainable, R-Realistic, T-Timely.
2. Weight the goals: Assign a weight to each goal by using the importance and difficulty.

Weight=importance x difficulty

Importance was graded by the patient and difficulty was graded by both the patient and therapist.Importance: 0 = not at all (important),1 = a little (important),2 = moderately (important),3= very (important).Difficulty: 0 = not at all (difficult),1 = a little (difficult),2 = moderately (difficult),3= very (difficult).

If the goal is “not at all important” it will not be selected, and if not at all difficult it has presumably already been achieved, so that in effect these resolve to 3 point scales. If a weighting system is not used, a value of 1 is simply applied to weight in the formula.

Grading of goal attainment scale: If the patient achieves the expected level, this is scored at 0.If they achieve somewhat better than expected outcome this is scored at +1.If they achieve much better than expected outcome this is scored at +2.If they achieve somewhat worse than expected outcome this is scored at -1.If they achieve much worse than expected outcome this is scored at -2.

Goal Attainment Scale score calculation: Goal Attainment Scale score is calculated by the formula of Goal Attainment Scale T score.

$$\text{Goal Attainment Scale T score} = 50 + 10 \sum (w_i x_i) / [(1-p) \sum w_i^2 + p (\sum (w_i)^2)^{1/2}]$$

Where:

- w_i= the weight assigned to the ith goal (if equal weights, w_i= 1)
- x_i= the numerical value achieved (between -2 and +2)
- p = the expected correlation of the goal scales

For practical purposes, according to Kirusek and Sherman, ρ most commonly approximate to 0.3, so the equation simplifies to:

$$\text{Overall Goal Attainment Scale T score} = 50+ 10 \sum (w_i x_i) / \sqrt{(0.7 \sum w_i^2 + 0.3(\sum w_i)^2)}$$

Procedure to Assess Goal Attainment Scale: In this study there are 5 goals selected to assess goal attainment scale, they are 1.weight shift side to side,2.weight shift forward and back,3.leaning down on elbow,4.reaching forward with clasped hands,5.sit to stand with clasped hands Each goal is graded by goal attainment scale score. This goal has given to the patients who had undertaken the ‘Goal Attainment Scale’. Each goal given to the patients are explained clearly by therapist and ask the patient to complete the goal as much as possible. While doing the task if the patient feels fatigue or uncomfortable the particular task has to be stopped.

GOAL ATTAINMENT SCALE: (for each goals -Importance, Difficulty, Level at admission, Level at discharge)

Score		Goal attainment level
2	20 Repetition	Best anticipated outcome
1	10 Repetition	More than expected outcome
0	5 Repetition	Expected outcome
-1	3 Repetition	Less than expected outcome
-2	2 (or) below	Unfavourable outcome

Example of Subject 1:

Goal	Importance	Difficulty	Weight (ixd)	Baseline score	Outcome score
Goal 1	1	3	3	0	2
Goal 2	1	3	3	0	2
Goal 3	1	3	3	0	2
Goal 4	1	3	3	0	1
Goal 5	1	3	3	0	1
			Sum =15		

$$\text{Overall Goal Attainment Scale T score} = 50+ 10 \sum (w_i x_i) / \sqrt{(0.7 \sum w_i^2 + 0.3(\sum w_i)^2)}$$

Starting with: $\sqrt{(0.7 \sum w_i^2 + 0.3(\sum w_i)^2)}$
 We have $\sqrt{(0.7(9+9+9+9+9) + 0.3(15)^2)}$
 $= \sqrt{(31.5+67.5)}$
 $= \sqrt{99}$
 $= 9.94$

Then applying the full formula

The baseline Goal Attainment Scale T score is $50+10x(0)/9.94= 50+0 = 50$

The outcome Goal Attainment Scale T score is $50+10x(24)/9.94 =50+240/9.94=50+24.14=74.14$

Procedure to assess berg balance scale: Berg balance scale has 14 items designed to measure balance. Equipments needed such as Ruler or inch tape, two standard chairs (one with arm rest, one without) footstool or step, stopwatch or wristwatch, 15 feet walkway. Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item. The patient has to complete the 14 item tasks under the guidelines and supervision by therapist.

Berg Balance Scale scoring: (score range from 0 to 4) Total score maximum 56(14itemsx4 max score)

BBS 14 task items: 1) sitting to standing, 2)standing unsupported, 3) sitting with back unsupported but feet supported on floor or on a stool, 4) standing to sitting,5) transfers, 6) standing unsupported with eyes closed,7)standing unsupported with feet together, 8) reaching forward with outstretched arm while standing, 9) pick up object from the floor from a standing position,10) turning to look behind over left and right shoulders while standing, 11) turn 360 degrees, 12) place alternate foot on step or stool while standing unsupported, 13) standing unsupported one foot in front, 14) standing on one leg.

Outcome measures: Outcome measures used in this study is Berg Balance Scale and Goal Attainment Scale to assess the balance improvement in acute middle cerebral artery stroke patients.

Data Analysis: Data analysis was performed with SPSS version 16.0.Statistical analysis including mean and standard deviation was calculated for all measurement .The mean differences with standard deviation for outcome measures of Berg Balance Scale and Goal Attainment Scale was calculated by pre and post assessment of the therapy (first and fifth day of the therapy).

Berg balance scale: The values were obtained by mean scores, the pre-test value for berg balance scale is 23 and the post-test mean value is 40.57. Hence, when compare pre-test value the post –test value shows better results.

Goal attainment scale: The values were obtained by mean scores, the pre-test value for Goal Attainment scale is 38.42 and the post-test mean value is 63.28. Hence, when compare pre-test value the post –test value shows better results.

RESULTS

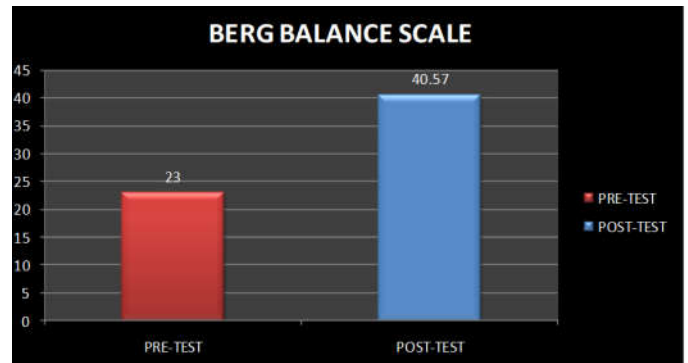
Table 2. Mean value of berg balance scale

RESULTS	BERG BALANCE SCALE	
	Pre-test	Post-test
Mean value	23	40.57
Mean difference	17.57	

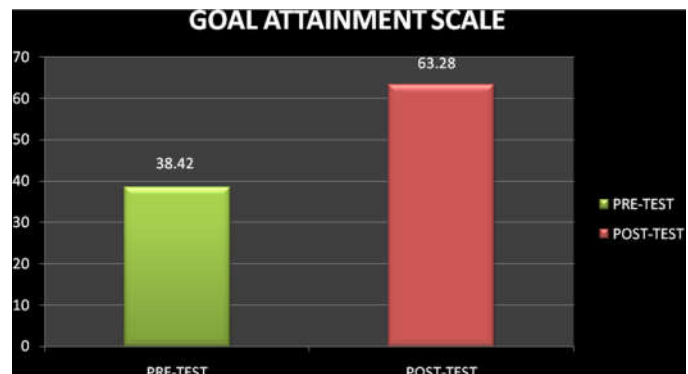
Table 3. Mean value of goal attainment scale

RESULTS	GOAL ATTAINMENT SCALE	
	Pre-test	Post-test
Mean value	38.42	63.28
Mean difference	24.86	

Graphical Representation



Pre test and post test values of berg balance scale



Pre test and post test values of goal attainment scale

DISCUSSION

Balance problems are common after stroke, if balance has been affected, patient may feel dizzy or unsteady which could lead to a fall or loss of confidence when walking and moving around. Balance involves the coordination and stability of our bodies in our surroundings. It affects most day to day activities, such as moving around and reaching for objects. If the balance is impaired, patient may feel dizzy or unsteady. So this can reduce their confidence and increase risk of having a fall. If balance problems are lasted for a long time, it may affect their quality of life. Balance is importance to maintain and do the activities of daily living such as sitting, standing, walking. In stroke patient, they have difficulty to maintain balance in normal posture like sitting,standing. Sitting balance is necessary to progress the improvement of standing and walking. To evaluate the balance in patient with stroke some important factors must be considered. an accurate medical history, including history of falls and medications in use is necessary. Physiological systems and their different contributions to balance control allow therapists to evaluate the particular impairment, combination of impairments, disabilities that affect a patient. Clinical tests are useful to identify balance impairment and focus on functional activities to assess the test patient have to maintain their balance while performing functional task in various ranges of difficulty according to the kind of activity preformed, such as sitting, standing in different position, and walking. The finding of this study compares the feasibility of Goal attainment scale and berg balance scale in hemiparetic middle cerebral artery stroke patients. Study suggests that goal attainment scale is a better outcome measure compared to Berg Balance Scale for its dynamic and static components. It is used for different patients

to attain different goals. Whereas Berg Balance Scale is a standardized scale which cannot be flexible and modify as such of Goal Attainment Scale.

While assessing pre-test, patient had difficulty to score the maximum because of the impairments and most of the tasks are difficult to score in Berg Balance scale. Whereas in goalattainment scale patient was able to score the minimum. In Goal Attainment Scale patient were able to concentrate in one particular goal according to their impairment. In this scale it has 5 goals and most of it is in sitting balance. But Berg Balance Scale has 14 components which consist of both static and dynamic balance.it leads the patient to have a difficulty to attain maximum score in this scale. In goal attainmentscale, goals are setted accordingly to need of patients goal. Patients were motivated and interested to participate in goalattainment scale. Goal Attainment Scale is a numerical scale. It has score ranging from -1 to 2.to calculate pre-test and post-test value we have to convert the score in to the Goal Attainment Scale T score formula. Goal Attainment Scale T score is taken for pre-test and post-test values. Post-test value of both scale showed improvement score compare with pre-test values. Both the scale showed improvement score in this study but goal attainment scale showed better results than the berg balance scale. From these findings we state that goal attainment scale can be used to assess patients in Middle Cerebral Artery stoke with balance impairments.

Limitations and Suggestions

1. Sample size was small
2. Study was done only with middle cerebral artery ischemic stroke
3. Haemorrhagic stroke patients were not included in the study
4. Only male patients were taken Larger population can be included in the study.
5. Further studies can be carried out in other various neurological conditions.
6. Reliability, validity can be evaluated for both scales.

Conclusion

From this study we concluded that goal attainment scale is better scale to assess balance impairment in Middle Cerebral Artery stroke patients than berg balance scale. Statistical analysis showed better results in goal attainment scale than the berg balance scale.

Conflicts of Interests: The authors declare that there is no conflict of interests.

Ethics: The article was financed by self funding.Ethical approval was given by the Physiotherapy and Rehabilitation center Alahsa hospital.Each participant was given an information sheet and signed an informed consent form.

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