

The Effects of Side of Brain Lesion on Balance and Activities of Daily Living in Stroke Patients

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Abstract

Objective: The study was done to find out the difference in balance score and ADL Score between right and left sided stroke patients. **Methods:** The study was of an Analytical design, with 30 subjects, 20 were men and 10 were women, all subjects were right handed, assigned into two groups, 15 subjects in each, according to the inclusion and exclusion criteria and carried out at Physiotherapy O.P.D. of CSS Hospital, Jai Multispecialty Clinic, Physiocare Clinic and residential care centre in and around, Meerut. In both group balance and ADL were assessed by using the BBS and mBI respectively. The collected data were of mean and standard deviation of balance score and ADL score, and has been analyzed using SPSS software. Mann Whitney U test was used to find the difference between the two groups. **Results:** The results showed that there were no significant difference in balance and ADL between right and left sided stroke with respect their balance score ($p = 0.755$). The result also showed that the activities patients were performing depended on their balance capability. So the balance of the patient does not vary with side of lesion on late recovery but it is inevitably impaired following stroke.

Keywords: Stroke; Lesion side; Balance and functional recovery.

Introduction

Stroke resulting from cerebro vascular accident is a common neurological impairment. After coronary artery disease and cancer of all type, stroke is the third commonest cause of death worldwide and most important single cause of severe disability in people living in the community. The prevalence of stroke is higher among Asians and in Indians. It is about 250 -300/100000 per year.[1-2] Stroke causes problems across multiple systems, including motor control, upper extremity function, gait and balance.[3] Balance is frequently disturbed following stroke because it is a complex process that requires an

interaction between the sensory and motor systems. Balance is the ability to maintain equilibrium in a gravitational field by keeping the centre of mass of body over its base of support.[4]

Hemisphere difference has been reported in the area of motor programming. The left (dominant) hemisphere has a primary role in the initiation and sequencing of movements while the right (non-dominant) hemisphere has a role in sustaining the movements and posture. This finding suggests that the person with left hemisphere were able to make less use of sensory information to update and modify the direction of the movement than persons with right hemisphere damage because the left hemisphere is responsible for motor programming.[5,6]

Balance of the patient is strongly associated with functional measures than with laboratory measures of spontaneous sway and induced sway. Balance scales are specifically designed to measure the functional standing balance in a clinical setting and a strong validity and reliability has been demonstrated in stroke patient.[7,8]

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Statement of Study

Does there is a difference in balance score and ADL score between right and left sided stroke patients?

Aims and Objectives

To investigate the difference in balance score and ADL score between right and left sided stroke patients.

Materials and Methods

The purpose and procedure of the study was explained to the subjects and informed consent was obtained. There was no criteria regarding time or type of stroke. Demographic data was collected on behalf of Berg Balance Scale and Modified Barthel Index, along with side of weakness and number of attack, obtained from patients self reports and cross checked with patients relatives. The stage of lower limb recovery and voluntary control of involved leg was assessed using Burnnstrom stage of recovery. Patient were passively made to stand to find out their ability to stand for thirty second unassisted. Patient who had difficulties in understanding some compounds of scales had a practical demonstration of certain sub group of BBS. No verbal encouragement or feedback was provided throughout the procedure but patients were assured regarding prevention of fall. We asked their ability perform and independence in ADL using mBI. The entire assessment was taken on a single occasion.

Berg Balance Scale

The Berg Balance Scale validated for people with stroke, was used to measure the balance ability of people in the sample. Fourteen observable balance tasks, representing functional movements common in everyday life, such as standing up from sitting and picking up an object from the floor were tested. Each task is scored on a five point scale (0-4)

with 0 indicating an inability or need for maximal assistance to complete the task or perform task. Following the guideline of the test developers, the maximum score of this test is 56 which indicated balance ability within normal range, 0-20 wheelchair bound, 21-40 walking with assistance, 41-56 independent.

Modified Barthel Index

The modified Barthel Index specifically measures the degree of assistance required by an individual on ten items of mobility and self care activities of daily living. It is an ordinal scale that comprises score for feeding mobility personal hygiene, ambulation, bowel and bladder ability and dressing skills. Level of measurements are limited to either complete independence or needing assistance. Each performed item is assessed on an ordinal scale with a specified number of points assigned to each level of ranking. The maximum score is twenty (20). Barthel Index is easy to administer and reliability is proven for functional evaluation in patients with stroke. A score of 20 indicated independence, score of 18-19 indicated light dependence, score of 16-17 indicated moderate dependence and score of 15 or less indicated severe dependence.

Hypothesis

Experimental Hypothesis: There may be a significant difference in balance and ADL scores between right and left sided stroke patients.

Null Hypothesis: There may not be a significant difference in balance and ADL scores between right and left sided stroke patients.

Significance

This research should be able to give concrete base line information regarding the difference in balance and ADL between right and left sided stroke patients.

The result of this study would be widely applied in clinics as well as community

rehabilitation.

This research would upgrade the professional skills and show the path for future research.

Limitation of Study

- Small sample size.
- The selection criteria was not based on artery lesion.
- The subjects had variable level of recovery in their upper and lower limbs.
- Only lower limb recovery was considered.

Convenient sample of 30 subjects, according to the inclusion and exclusion criteria, randomly assigned into two groups were include in the study. The study was conducted at Physiotherapy O.P.D. of CSS Hospital, Jai Multispecialty Clinic, Physiocare Clinic and residential care centre in and around, Meerut.

Variable

Dependent Variable: Balance score and ADL score.

Independent Variable: Side of Brain Hemisphere Lesion.

Inclusion Criteria

- Patient with first stroke.
- Able to maintain independent stance for 30 seconds.
- Burnnstrom stage of recovery IV.
- Subjects with unilateral stroke.

Exclusion Criteria

- Any other Neurological condition other than stroke that can interfere with balance and ADL.
- Cognitive and psychiatric problems.
- Marked auditory and visual impairments.

- Major orthopedic problems.
- Patient with ataxia.
- Patients more than 70 years of age.
- Impaired ability to follow simple verbal instruction.

Instrumentation

- Ball
- Chair
- Inch tape
- Pen
- Stationary
- Stool
- Subjects (30)
- Stop Watch.

Protocol

After getting their informed consent the subjects were randomly assigned into two groups.

Control Group [Group 1]: 15 subjects (14 males & 1 female)

Experimental Group [Group 2]: 15 subjects (6 males & 9 females)

To measure the stage of lower limb recovery and voluntary control of involved leg Burnnstrom stage of recovery method was used and balance was assessed on behalf of Berg Balance Scale. While the ADL was assessed on behalf of Modified Barthel Index. No verbal encouragement was provided to the subjects but the subjects were assured regarding the prevention of fall and the data was collected.

Data Acquisition

Data was collected in a quiet room for each subjects by the same investigator. Data was collected in the data collection form along with other details of the subjects.

Data Analysis

Statistically the characteristics of the groups and the results within and between the groups were compared. This data was analyzed by using Mann Whitney U test to find the difference between the two groups through SPSS software.

Results

In this study 30 subjects were used, who

Table 1: Gender Wise Distribution of Subjects with Sidewise Distribution

Side Involvement	Sex		Total
	Male	Female	
Right	14	1	15 100 %
Left	6	9	15 100 %

were suffering from either right and left side brain lesions, randomly assigned into two groups i.e. control and experimental.

According to gender wise, 93.3% males & 6.1% females were affected from the right side stroke while 33.3% males & 66.7% females were affected from the left sided stroke.

According to the age and side involvement, mean age for right sided stroke patient were 56.07 ± 9 years and for left sided stroke patients were 60.47 ± 6 years. The p - value of right side group was 1.531 and the p - value of left side group was 0.137. So there was no significant difference between the two groups with respect to age.

According to the Berg Balance Scale, the mean value of score for right sided stroke patients were 35.73 ± 4.43 and for left sided stroke patients were 35.40 ± 4.42 , while the z-value, which is based on Mann Whitney U

Table 2: Age with Side Involvement

Side Involvement	N	Minimum Age	Maximum Age	Mean	Standard Deviation	t - Value and p - Value
Right	15	40	69	56.07	9.00	1.531
Left	15	49	70	60.47	6.56	0.137

Table 3: BBS Score for Both Groups

Side involvement	N	Minimum BBS Score	Maximum BBS Score	Mean	Standard Deviation	Z - Value P - Value
Right	15	27	42	35.73	4.43	0.313
Left	15	28	42	35.40	4.42	0.755

Figure 1: Mean BBS Score

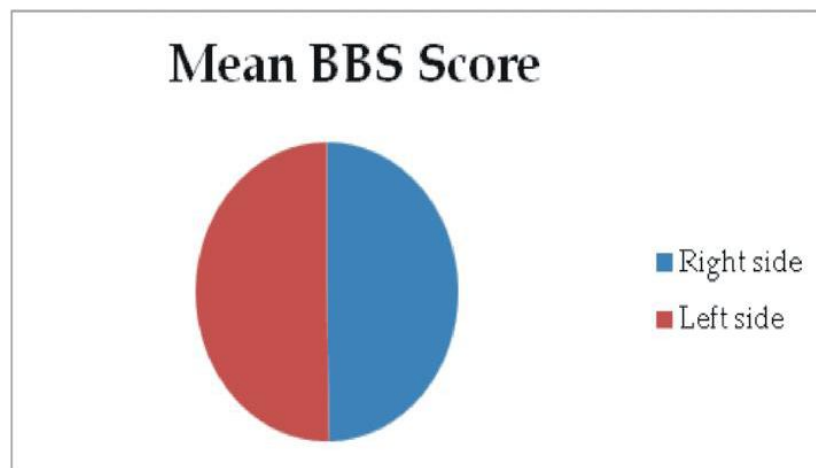


Table 4: BI Score for Both Groups

Side Involvement	N	Minimum BI Score	Maximum BI Score	Mean	Standard Deviation	Z - Value P - Value
Right	15	7	17	11.80	2.08	0.617
Left	15	10	16	12.53	1.77	0.538

Figure 2: Mean BI Score

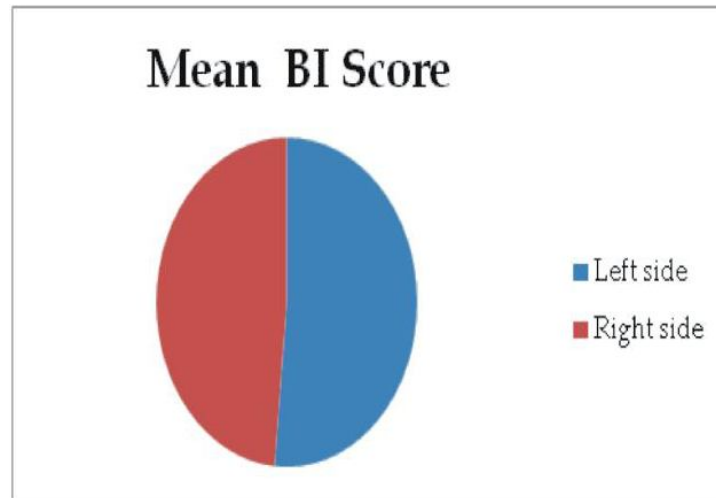
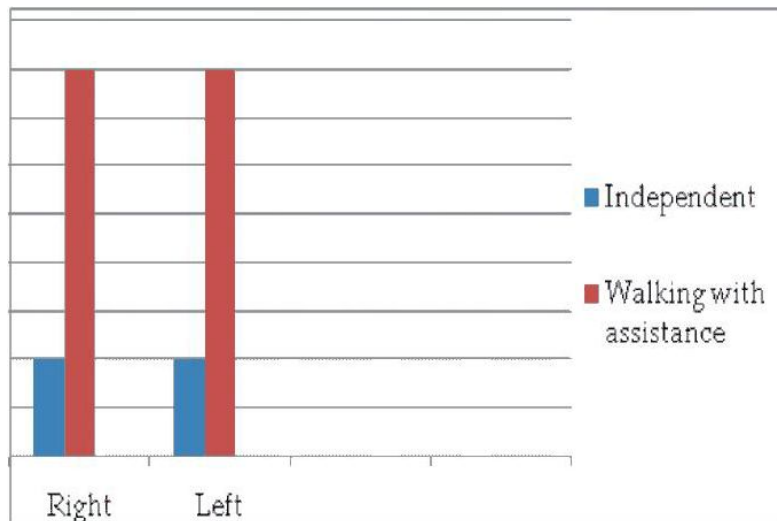


Figure 3: Distribution of Subjects Based on BBS Score

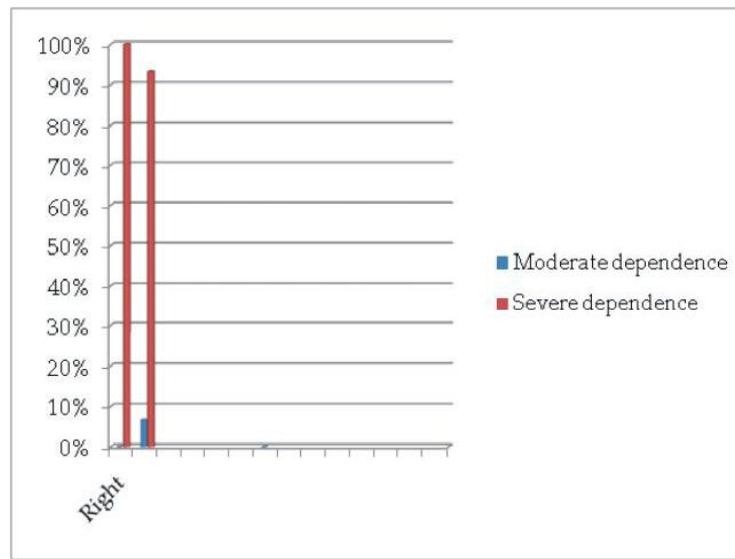


test was 0.313 for right sided & 0.755 for left sided stroke patients. So there was no significant difference between two groups with their balance score.

According to the Modified Barthel Index, the mean value of score for right sided stroke patients were 11.80 ± 2.08 and for left sided stroke patients were 12.53 ± 1.77 , while the z-value, which is based on Mann Whitney U test was 0.617 for right sided & 0.583 for left sided stroke patients. So there was no

significant difference between two groups with their mBI score.

According to the BBS, in both right and left sided stroke patients 20% were in the category of independent and 80% were in the category of walking with assistance. While according to mBI score, in right sided stroke patients 100% were under severe dependence and in left sided stroke patients 6.7% were moderate dependent and 93.3% were severely dependent for activity of daily living.

Figure 4: Distribution of Subjects Based on mBI Score**Table 5: Correlation between BBS and mBI for Right and Left Sided**

	BBS		BI	
	Right	Left	Right	Left
Correlation coefficient	0.556	0.607	0.556	0.607
P - Value	0.031	0.016	0.031	0.016
N	15	15	15	15

The correlation between the balance score and activities of daily living for right and left sided stroke patients was assessed on behalf of correlation coefficient and p-values of both the group. The correlation coefficient value for both the group was 0.556 and 0.607 while the p-values of both the group was 0.031 and 0.016, which shows that there was a positive correlation between balance score and BI score in both the groups.

Discussion

In the present study we tried to find out the difference in balance and ADL of patients with right and left sided brain lesions. The ability to maintain balance is fundamental for ADL requiring upright mobility such as transfer and walking. Control of sitting and standing balance have been shown to be important milestones in the recovery of stroke and the focal part of rehabilitation is the facilitation of balance control.

The present study demonstrated that there was no significant difference in balance between the right and left sided stroke patients as p - value is 0.755.

In the present study all patients were able to stand for 30 seconds unassisted. Laufer *et al* suggested that the patients who were able to stand independently, one and two months following stroke, found no difference in balance between right and left hemisphere.[9]

Though there was no difference in balance between the right and left hemisphere damaged patients, balance was invariably impaired in both groups, the minimum score was 36 and maximum score was 42 out of 56.

In present study we found that there is no difference between two groups with respect to BI score but BI score was less in both the groups. Most of the patients were in the category of severe dependency for their daily activities. The reason for impairment in ADL was because upper limb recovery was incomplete and BI consists of activities like

grooming, toilet use, feeding and dressing which requires usage of upper extremity. The present study also indicated that there was an association between balance of patients and the activities which can be performed.

The study also showed that there was no association between the balance score and the gender of the patients. This is similar to previous studies which indicated that gender of patients was not a predictor of functional skill acquisition in stroke. Keenan *et al* suggested that balance of patients was not found to be dependent on gender.[10] Macciocchi *et al* to establish the relation between genders of patients with functional outcome and found that there was not a predictor of functional outcome in patients with stroke.[11] The restoration of balance skills is a cornerstone of stroke physiotherapy. Some or all of these tasks generally become more difficult in stroke patients.

Future Research

1. Future studies may be done with more no of subjects.
2. Future studies may be done to evaluate difference in balance with specific artery differentiation.
3. Future studies may be done to find out the difference in balance between patients with and without spatial problems.

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