Original Article

RELATIONSHIP BETWEEN INDEPENDENT SITTING BALANCE AND TYPE OF STROKE IN PATIENTS WITH LEFT SIDED HEMIPARESIS

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ABSTRACT

Background and introduction: Stroke is the third most common cause of death in the Western Hemisphere and the most common cause of adult disability and balance problems. The purpose of this study was to find the dependency of independent sitting balance on type of stroke (hemorrhagic or ischemic) in patients with left sided hemiparesis.
Method: This was a study of 38 patients with onset of first stroke in their life who were different only in terms of stroke origin, infarction and hemorrhage. We assessed the sitting balance of all patients using the Trunk Control Test and divided them in three catagories: No Sitting Balance (0-24), fair sitting balance (36-61), good sitting balance (62-100). Then, we analyzed the results to find the relation between type of stroke and sitting balance.
Results: 38 patients with left-sided weakness, 20 patients had hemorrhagic stroke and 18 had ischemic stroke. Out of 20 patients of hemorrhagic stroke, 11 (55%) could sit and out of that also, 6 could sit independently and 5 could sit with little support while 9 (45%) could not sit at all. In case of patients with ischemic stroke, out of 18 patients, 9 (50%) could sit but from that 4 could sit independently and 5 required some support. Cross tabulation and chi-square revealed no relationship between type of hemorrhage and independent sitting balance in patients with left-sided hemi paresis (X^2=0.296, p>0.05).
Conclusion: This suggests that stroke type should not be taken into consideration as a factor in sitting balance assessment and further retraining of hemiparetic stroke survivors. No relationship exists between type of stroke and sitting balance in patients with left sided hemiparesis.

KEYWORDS: Stroke; Trunk control test; Left sided hemiparesis.

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INTRODUCTION

Stroke is the third most common cause of death in the Western Hemisphere and the most common cause of adult disability; of the survivors, about 50% will have a significant long-term disability.[1] Balance problems are thought to be common after stroke, and they have been implicated in the poor recovery of activities of daily living (ADL) and mobility and an increased risk of falls.[2-5]

Hemiparesis is the most frequent neurological deficit after stroke. Hemiparesis is weakness on one side of the body. Hemiparetic stroke patients frequently present balance abnormalities. Balance problems in hemiparetic patients after stroke can be caused by different impairments

in the physiological systems involved in postural control, including sensory afferents, movement strategies, biomechanical constraints, cognitive processing, and perception of verticality.[5&6]

Two main mechanisms result in stroke. Strokes can be ischemic, the result of a thrombus, embolism or conditions that produce low systemic perfusion pressures.the resulting lack of cerebral blood flow (CBF) deprives the brain of needed glucose and oxygen, disrupts cellular metabolism and leads to injury and death of tissues (Infarction). Strokes can also be hemorrhagic, with abnormal bleeding into extra vascular areas of the brain secondary to aneurysm or trauma. Hemorrhage results in increased intracranial pressures with injury to brain tissues and restriction of distal blood flow.[7] Although it is well recognized that hemorrhagic stroke is associated with significantly higher acute mortality than ischemic stroke, it is frequently stated that survivors of hemorrhagic stroke have a better neurologic and functional prognosis than their nonhemorrhagic counterparts with similar brain volume involvement or similar stroke severity.[8-11]

A severe stroke will cause the absence of righting and equilibrium reactions; however, after a mild stroke, these reactions are present but decreased in quality and timing or delayed. Good sitting balance is a prerequisite for functional transfers, standing balance, and ambulation of stroke patients. Visual, proprioceptive, vestibular, and auditory input are important to help a patient regain good sitting balance.[12] Sitting balance is not a functional activity, but the ability to maintain or attain sitting balance is believed to be necessary to perform functional activities such as dressing and transferring and eating in a seated position. Sitting balance is a crucial component to perform ADL.[13-16] Some studies have found that sitting balance at an early stage could predict activities of daily living outcome at a late stage in patients after a stroke.[13-18] Trunk symmetry, selectivity of movement and normal tone are components of normal sitting balance. Treatment in sitting, therefore, entails a wide range of techniques including eliciting righting reactions, facilitating normal lengthening and shortening of the trunk side flexors, reinforcing graded trunk extension and encouraging selective activity of the abdominal muscles.[19] The ability to balance is maintained by a delicate interplay among the sensory, motor and cognitive systems, and changes in the ability to balance, particularly in complex situations, can occur as a result of stroke.[13&15]

Outcome of mobility one year after stroke can be predicted validly by including functional status, sitting balance, moment of admission to the rehabilitation centre after stroke onset and age.[20] Trunk control or sitting balance has been shown to be a valid predictor of stroke rehabilitation outcome and to correlate positively with established functional and motor assessments.[21&22] The purpose of this study was to find the dependency of independent sitting balance on type of stroke (hemorrhagic or ischemic) in patients with left sided hemiparesis.

MATERIALS AND METHODS

This study was performed on 38 patients with stroke and left sided hemiparesis. Patients were recruited from the Department of Neurology, Sir Sunderlal hospital, Banaras Hindu University according to inclusion and exclusion criteria after signing the informed consent form. Inclusion criteria: (1) Confirmed diagnosis of left sided hemiparesis secondary to first cardiovascular attack in their life. (2) Medically stable and able to give informed consent. (3) No other documented vestibular, orthopedic disorder and previous motor disability that can affect balance. We excluded volunteers if they had Subarachnoid hemorrhage diagnosed using laboratory tests, unable to understand simple verbal instructions or having Mini Mental Status Examination (MMSE) < 23 and subjects taking any drugs currently causing dizziness, drowsiness and light headedness.

INSTRUMENTS

Trunk Control Test

Trunk control after stroke is an important predictive feature related to the level of eventual recovery. The TCT examines four simple aspects of trunk movement. The patient lies supine on the bed and is asked to roll to the weak side, roll to the strong side, sit up from lying down, and sit in a balanced position on the edge of the bed, with the feet off the ground for a minimum of 30 seconds.[22] The scoring has

arbitrary weights, and is as follows:

0 - unable to perform movement without assistance
12 - able to perform movement, but in an abnormal style, for example, pulls on bed clothes, rope or monkey pole, or uses arms to steady self when sitting
25 - able to complete movement normally
The total score for the Trunk Control Test ranges from minimum 0 to maximum 100 points, a higher score indicating a better performance. Inter-rater reliability of the Trunk Control Test was examined by means of Spearman rho correlation coefûcient (r=0.76) for the total Trunk Control Test score on 20 non-acute stroke patients. Construct validity was evaluated by calculating correlation coefûcients between the Trunk Control Test and the gross motor function subscale of the Rivermead Motor Assessment at 6, 12 and 18 weeks post stroke. Coefûcients ranged between 0.70 and 0.79. Franchignoni et al. examined 49 stroke patients and evaluated internal consistency and predictive validity. Duarte et al. evaluated 28 stroke patients and examined predictive validity as well.[17,22-24]

PROCEDURE

38 stroke patients with left sided hemiparesis were recruited from the Department of Neurology, Sir Sunderlal hospital, Banaras Hindu University according to inclusion and exclusion criteria. Informed Consent form was obtained from every patient to avoid any ethical issue. Complete neurological examination of each subject was done for which we obtained a complete assessment form. All the radiological medical reports of the patients were analysed. Side of hemiparesis and type of stroke were determined weather it is hemorrhagic or ischemic stroke. Sitting balance of the patients was measured by using the Trunk Control Test (TCT). We divided the scores into three catagories: No Sitting Balance (0-24), fair sitting balance (36-61), good sitting balance (62-100). Appropriate instructions were given while performing each subset of TCT. Patients were provided with complete safety while performing each item of TCT in case any of them feel the risk of falling or uncomfortable. After collecting the data for Trunk Control Test, results were analyzed to find the relation between type of stroke and the ability to maintain sitting balance

TABLES

Characteristics of Hemiparetic Patients Whose Chart Descriptions of Sitting Balance WereExamined

Type of stroke	Men	Women	Total	Age (Mean±SD)
Hemorrhagic	11	9	20	52.9±17.8
Ischemic	8	10	18	59.8±10.2

Relationship between Type of Stroke and Sitting Balance in 38 Patients with Left sided Hemiparesis

Trunk Control Test		Type of stroke		Total
		Hemorragic Stroke	Ischemic Stroke	
0-24 (no sitting balance)	Count	9	9	18
	% within Type of stroke	45.00%	50.00%	47.40%
36-61 (fair sitting balance)		5	5	10
	% within Type of stroke	25.00%	27.80%	26.30%
62-100 (good sitting balance)	Count	6	4	10
	% within Type of stroke	30.00%	22.20%	26.30%
Total	Count	20	18	38
	% within Type of stroke	100.00%	100.00%	100.00%

$x^2 = .296$, $p > .001$

DATA ANALYSIS

The data was analyzed by using Statistical Package of Social Science-SPSS software (version 16) for windows. The arithmetic mean and standard deviation of the age of patients was calculated. Relationship between type of stroke and independent sitting balance was analysed using cross tabulation and Chi-Square test was used to find whether the results were statistically significant or not. The strength of this relationship was calculated using phi-square test. The significant level was set at 5% ($p \leq 0.05$).

RESULTS

Table 1 summarizes the mean and standard deviation of age of patients and number of patients with hemorrhagic stroke and ischemic stroke. Cross tabulation and chi-square revealed no relationship between type of hemorrhage and independent sitting balance in patients with left-sided hemi paresis ($X^2=0.296$, $p>0.05$).
Of 38 patients with left-sided weakness, 20 patients had hemorrhagic stroke and 18 had ischemic stroke. Out of 20 patients of hemorrhagic stroke, 11 (55%) could sit and out of that also, 6 could sit independently and

5 could sit with little support while 9 (45%) could not sit at all. In case of patients with ischemic stroke, out of 18 patients, 9 (50%) could sit but from that 4 could sit independently and 5 required some support (Table 2).

DISCUSSION

In this study, we investigated the relationship between independent sitting balance and type of stroke (hemorrhage and infarction) in left sided weak patients. In patients with which type of stroke, sitting balance is much disturbed? We found that incidence of hemorrhagic stroke was more than that of ischemic stroke and both types of stoke whether it is hemorrhage or infarction equally affects sitting balance. This suggests that stroke type should not be taken into consideration as a factor in sitting balance assessment and further retraining of hemiparetic stroke survivors. Pesi H. Katrak[11] did a study to compare the functional outcome of stroke patients with cerebral infarction (CI) and intracerebral hemorrhage (ICH) after rehabilitation. They found that although patients with ICH had a greater level of disability on admission, they achieved significantly greater gains in function than patients with CI after rehabilitation. This was found regardless of the severity of disability on admission. Results of our study are not in favor of this study and the reason might be very less number of patients in our study as they took 718 stroke patients in their study. Another reason may be that we have included only the patients with left sided hemiparesis in our study while they used both sided hemiparetic patients that is not good for accuracy of the results.

Dr. Henrik Stig Jorjensen[25] et al compared stroke severity, risk factors, and prognosis in patients with intracerebral hemorrhage versus infarction. They concluded that the type of stroke has no influence on stroke prognosis in general. The poorer prognosis in patients with intracerebral hemorrhage is due to the increase in frequency of intracerebral hemorrhage with increasing stroke severity. Results of our study are in support with the results of this study as we could not find any relation between type of stroke and independent sitting balance and they too could not find any relation between type of stroke and stroke prognosis. And it has been proved in many studies that sitting balance at an early stage could predict activities of daily living outcome at a late stage in patients after a stroke.[13-18] Hence it can be said that good sitting balance at early stage is directly proportional to better stroke prognosis in later stages. Because sitting balance is a significant predictor of recovery after stroke, our finding may have important implications for predicting functional improvement in hemiparetic patients.

CONCLUSION

Out of the 38 patients whose records we examined, more than 50% of the patients could maintain sitting balance. Of those with hemorrhagic stroke, however, 45% could not maintain sitting balance independently, and 50% of those with ischemic stroke could not. We found insignificant relationship between the type of stroke and independence in sitting balance.

Conflicts of interest: None

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