

# Correlation of Voluntary Control (Brunnstrom Stage of Recovery) with Activities of Daily Living (adls) and Motor Function in Stroke Patients

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**Abstract** To find out correlation of voluntary control (Brunnstrom stages of recovery) with ADLs and motor function in stroke patients.

**Method:** It is a cross-sectional analytical study of 30 subjects with post 2 weeks post stroke. Brunnstrom stages of motor recovery used to assess voluntary control (VC), Functional independence measure (FIM) scale and motor assessment scale (MAS) were administered to assess ADLs and motor function respectively. In this study correlation of arm (VC), and hand (VC) with self care domain of FIM and upper arm & hand function domain of MAS was tested. Correlation of leg VC with transfer and locomotion of domain of FIM and walking of MAS was tested. Spearman correlation coefficient was used to find correlation.

**Result:** correlation of arm VC with FIM self care is  $r=0.398$ . Correlation of hand VC with FIM self care is  $r=0.293$  and that of with MAS motor assessment is  $r=-0.125$ . Correlation of arm VC with MAS upper arm function is  $r=-0.05$ . Correlation of leg VC with walking is  $r=0.046$ . Correlation of leg VC with FIM transfer and locomotion is  $r=0.357$ . and with MAS sit to stand is  $r=0.155$ . Arm voluntary control has moderate correlation with self care activity. And correlation of leg voluntary control with walking.

**Conclusion:** voluntary control (Brunnstrom stages of recovery) has poor correlation with motor function and activities of daily living.

**Keywords:** FIM, MAS, voluntary control, Brunnstrom stages of motor recovery

## Introduction

Stroke is defined as a sudden neurological impairment resulting from interruption of the blood supply and brain tissue damage. The most common symptom of a stroke is sudden weakness and/or numbness of the face, arms or legs, most often on one side of the body [3].

Hemiplegia is the most common clinical feature, which is described as sided weakness of

Extremity, facial droop, and slurred speech [3]. Motor function recovery follows stereotypic

Patterns. It initially develops flaccid hemiplegia during the acute phase. Depending on

individual cases, however, flaccid hemiplegia evolves into spastic hemiplegia. It continues

To evolve into spastic synergy. [3].

Brunnstrom stage describes the evolution of hemiplegia, which is also known as Voluntary control. This Voluntary control grading is used to measure motor performance of patient [1].

Because of this residual impairment, most stroke survivors have difficulties to be independent with ADLs and ambulation [1]. FIM scale was used to assess activity of daily living. FIM is an 18 item scale and it measures physical, psychological, & social function. It uses the level of assistance

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**Table 1:** Brunnstrom stages of motor recovery. Brunnstrom S: Movement therapy in hemiplegia. New York, 1970, Harper & row.

Brunnstrom stages of motor recovery			
Characteristics			
Stage	Leg	Arm	Hand
1	Flaccidity	Flaccidity: inability to perform any movements	No hand function
2	Spasticity develops ;minimal voluntary movements	Beginning development of spasticity. Limb synergies or some of their components begin to appear as associated reactions.	Gross grasp beginning; minimal finger flexion possible.
3	Spasticity peaks; flexion and extension synergy present; hip-knee-ankle flexion in sitting and standing.	Spasticity increasing; synergy pattern or some of their components can be perform voluntarily.	Gross grasp; hook grasp possible; no release.
4	Knee flexion past 90 degrees in sitting, with foot sliding backward on floor, dorsiflexion with heel on floor and knee flexed to 90 degree.	Spasticity declining; movement combination deviating from synergies are now possible.	Gross grasp present; lateral prehension developing; small amount of finger extension and some thumb movement possible.
5	Knee flexion with hip extended in standing; ankle dorsiflexion with hip and knee extended.	Synergies no longer dominant; more movement combinations deviating from synergies performed with greater ease.	Palmar prehension, spherical and cylindrical grasp and release possible.
6	Hip abduction in sitting reciprocal internal and external rotation of hip combined with inversion and eversion of ankle in sitting.	Spasticity absent except when performing rapid movements; isolated joint movements performed with ease.	All types of prehension, individual finger motion, and full range of voluntary extension possible.

an individual needs to grade functional status from total independence to total assistance.

A commonly used tool to measure motor function and functional ability following stroke is the Motor Assessment Scale (MAS) (Carr et al 1985). The MAS is a criterion-based scale assessing 8 domains of functional motor activity with each item scored on a 7-point ordinal scale (ranging from 0= no motor function, to 6= optimal task performance or performance completed within the set time frame) (Carr and Shepherd 1998) [4]. Since Voluntary control (Brunnstrom stages of recovery) is commonly practiced for assessment and goal setting in stroke rehab. This study aims to find out correlation of VC with ADLs and motor function in stroke patients so if there is correlation between VC and motor function or VC and activities of daily living we can give emphasis on voluntary control training to patient in stroke.

**Material and Methodology**

This is a Cross sectional study of 30 subjects who have suffered from stroke (hemiplegia). Subjects with hemiplegia post 2 weeks of stroke, conscious oriented and able to obey commands are included in study. Subjects with convulsion, shoulder dislocation, Fixed deformity of hand, Visually impaired, Shoulder hand syndrome, Aphasia, Behavior

problems, Complete sensory loss of upper limb were excluded . Written consent was taken from each individual. Functional Independence Measure was administered to measure functional score of Activities of Daily Living. Motor assessment scale was used to measure motor function and voluntary control movement of arm; leg and hand were scored according to Brunnstrom stage of motor recovery.

**Statistics:**

Data analysis was done using spearman Correlation coefficient test. Test of significant was set at p value 0.05.

**Result**

Table 1 shows that Correlation of arm VC with FIM self care is r= 0.398. Correlation of hand VC with FIM self care is r=0.293 and that of with MAS hand movement is r=-0.125. Correlation of arm VC with MAS upper arm function is r=-0.05. Correlation of leg VC with MAS walking is r=0.046. Correlation of leg VC with FIM transfer and locomotion is r=0.357.and with MAS sit to stand is r=0.155. Arm voluntary control has moderate correlation with self care activity. And correlation of leg voluntary control with walking.

**Discussion**

Voluntary control (Brunnstrom stages of recovery) is commonly practiced for assessment and goal setting in stroke rehab. This study tried to find correlation of component of

VC with Motor function and activities of self care in ADL. Study show that there is poor correlation of upper arm & hand voluntary control with motor function of upper limb and hand (MAS) and self care domain in activities of daily living (FIM). There is also poor correlation of lower limb vc with motor function of walking, sit to stand of components of MAS and transfer and ambulation components of activities of daily living in FIM. Thus this study shows improvement in voluntary control (Brunnstrom stage) may not directly transmit in improvement in motor function and activities of daily living. So in stroke rehabilitation, training of voluntary control may not change the motor function and activities of daily. Activities of daily living and specific activities of motor function need to train to show change in rehabilitation. This shows the need of task specific training in rehabilitation.

### Conclusion

Voluntary control (Brunnstrom stages of recovery) has poor correlation with motor function and activities of daily living.

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