

# The correlation between modified ashworth scale and fugl meyer assessment scale in chronic stroke rehabilitation using neurodynamics

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## SUMMARY

**Background:** Spasticity is common in upper motor neuron disorder. Obligatory synergies develop in stroke which affects functional mobility. Associated reactions can occur in stroke patients with strong spasticity and synergies which affect functional activity especially in the upper extremity.

**Objective:** To determine correlation of modified ashworth scale (MAS) and fugl Meyer assessment scale (FMA) used to assess spasticity and upper extremity performance in chronic stroke patients.

**Methods:** It was a randomized control trial. 41 stroke patients were recruited for the study. Data was collected from DHQ Hospital Jhelum. To control group conventional treatment and to experimental group conventional treatment with neurodynamics was applied, 10 rep/ set, 1set/ day, 3 days/week for 6 weeks. 0, 3rd and 6th week assessment was done through modified ashworth scale (MAS) and fugl Meyer assessment scale (FMA). Correlation analysis was done through SPSS version 21. This research is registered to WHO international clinical trials registry platform (ICTRP). Clinical trial number is NCT03822923.

**Results:** Spearman correlation analysis was done through SPSS version 21. At 0 and 3rd week  $r$  was -0.466 and at 6th week  $r$  was -0.580 and  $p$  value was  $<0.01$  at 0, 3rd, and 6th week.

**Conclusion:** This study concluded that there was moderate to high correlation between modified ashworth scale (MAS) and fugl Meyer assessment scale (FMA).

**Keywords:** Neurodynamics; Rehabilitation; Spasticity; Stroke

## INTRODUCTION

Spasticity is common in upper motor neuron disorder. Obligatory synergies develop in stroke which affects functional mobility e.g. If patient has LE extensor synergy it is difficult for him to walk with plantar flexion and inversion of foot with extension of hip and knee. Spasticity and synergies disappear as recovery progresses and isolated movement control develops [1]. Tonic reflexes appear in stroke which is similar to those seen in traumatic brain injury and cerebral palsy. Change in tone occurs with the movement of head or body position which is common in asymmetric tonic neck reflex (ATNR) in which extension of elbow on ipsilateral side with flexion on contra lateral side occurs with rotation of head. Associated reactions can occur in stroke patients with strong spasticity and synergies which affect functional activity especially in the UE [2,3].

If cerebellum is affected cerebellar ataxia and motor weakness occurs. If basal ganglia is involved (posterior cerebral artery syndrome) bradykinesia (slow movements), choreoathetosis and hemiballismus (involuntary movements) occur [4]. 53 percent of the patients with stroke have Impairment of sensation which ranges from loss of superficial or deep sensations [5]. Size of brain injury determines the amount of weakness [6].

Fugl Meyer assessment scale (FMA) is used to determine disease severity and functional recovery after stroke and it also help in the development of treatment plan [7,8]. Scoring is done from 0 to 66 for upper extremity performance. Its validity is 0.96. [9] Modified ashworth scale (MAS) is used to assess resistance to passive movement [10]. Reliability for upper extremity is high (0.77-0.86) [11].

Thamar J, et al. determined that early mobilization of limb combined with sustained stretching of 5 to 10 minutes of spastic muscles helps in the reduction of spasticity [12]. Electrical stimulation of antagonist muscles is effective to reduce tone. Sahin N in 2012 determined that electrical stimulation is effect to reduce spasticity after stroke [13]. Neurodynamic static and dynamic openers are good for pain relief or to reduce discomfort and producing neural movement without producing muscle tension and dynamic openers and closers are applied to treat tension dysfunction [14]. Present research investigated the correlation of modified ashworth scale (MAS) and Fugl Meyer assessment (FMA) used to assess spasticity and upper extremity performance in chronic stroke patients.

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**Word count:** 1203 **Tables:** 03 **Figures:** 00 **References:** 20

**Received:** 14.04.2023, Manuscript No. ipjnn-23-13653; **Editor assigned:** 17.04.2023, PreQC No. P-13653; **Reviewed:** 01.05.2023, QC No. Q-13653; **Revised:** 06.05.2023, Manuscript No. R-13653; **Published:** 15.05.2023

## METHODS

It was a randomized control trial. 41 stroke patients were recruited for the study. Data was collected from DHQ Hospital Jhelum and patients were randomized through tossing a coin (simple randomization) to experimental and control group. Chronic stroke patients with age 40 to 60 years were recruited for this study. To control group conventional treatment (stretching and range of motion exercises [15] and to experimental group conventional treatment (stretching and range of motion exercises) with neurodynamics was applied, 10 rep per set, 1set per day [16], 3 days per week for 6 weeks. 0, 3<sup>rd</sup> and 6<sup>th</sup> week assessment was done through modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA). Correlation analysis was done through SPSS version 21. This research is registered to WHO international clinical trials registry platform (ICTRP). Clinical trial number is NCT03822923.

## RESULTS

**Tab. 1. and Tab. 2.** Spearman correlation analysis was done through SPSS version 21. At 0 and 3<sup>rd</sup> week r was -0.466 and at 6<sup>th</sup> week r was -0.580 and p value was <0.01 at 0, 3<sup>rd</sup> and 6<sup>th</sup> week which indicates that there was moderate to high negative correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA) which was used to assess spasticity and upper extremity performance in chronic stroke patients **Tab. 3.**

## DISCUSSION

The results of this study suggest that there was moderate to high correlation between modified ashworth scale (MAS) and fugl meyer assessment scale (FMA) which was used to assess spasticity and upper extremity performance in chronic stroke patients. This study shows resemblance with some aspects of literature review as Wei, Xi-Jun, et al. concluded that there was fair to moderate correlation

between modified ashworth Scale (MAS) and fugl Meyer assessment scale (FMA) in 27 chronic stroke patients as a measure of upper extremity rehabilitation using robotic training [17]. The current study determined that there was moderate to high correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA) used for the upper extremity performance in 41 chronic stroke patients with rehabilitation using neurodynamics.

Godoi [18] did a clinical trial on 5 stroke patients and concluded that spasticity of bicep brachii muscle was reduced due to neurodynamic intervention. The mechanism behind decrease in spasticity in stroke patients was reduction of myoelectric activity; alternation of electrical signals in spastic muscles. The current study determined the correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA) used for the upper extremity performance and concluded that there was moderate to high negative correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA).

Jakob Lorentzen, et al. determined that there was no difference between neurodynamics and passive movements applied to reduce spasticity [19]. This study concluded that neurodynamics was effective to increase range of motion but there was no effect of neurodynamics on spasticity. The current concluded that there was moderate to high negative correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA) used for the assessment of upper extremity performance.

Jeong Kang, et al. did a randomized controlled trail on 18 stroke patients and determined that rhythmic neurodynamics was effective for improving upper extremity performance more than the general neurodynamic [20] as p-value was <0.05. The current concluded that there was moderate to high negative correlation between modified ashworth scale (MAS) and Fugl Meyer assessment scale (FMA) as value of r was (0.466-0.580) and p value was <0.01.

**Tab. 1.** Demographic data of the 41 chronic stroke patients.

Characteristics	Value
Age of patient (years)	51.98 ± 7.425
Sex (male/female)	18/23
Stroke type, (Ischemic /Hemorrhagic)	34/7
Paretic side (right/left)	25/16

**Tab. 2.** Mean and standard deviation of the MAS and FMA scale.

Scales	Mean ± standard deviation		
	0 week	3rd week	6th week
MAS	1.41 ± 0.670	1.41 ± 0.670	0.95 ± 0.973
FMA	27.10 ± 14.878	28.71 ± 15.875	30.61 ± 16.944

**Tab. 3.** Spearman's correlation coefficient (r) and p value between MAS and FMA scale.

Scales	FMA		
	r	p	
MAS	0 week	-0.466	<0.01
	3rd week	-0.466	<0.01
	6th week	-0.580	<0.01

## CONCLUSION

This study concluded that there was moderate to high

correlation between modified ashworth scale (MAS) and fugl Meyer assessment scale (FMA).

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