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Effectiveness of Sustained Stretching in Upper Limb Elbow Flexor Spasticity on Stroke Patients

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ABSTRACT

Introduction and background: Stroke is a sudden loss of neurological function caused by an interruption of blood flow to the brain characterized by paralysis or weakness typically on the side of the body opposite to the side of the brain lesion. In stroke, spasticity is one of the most common complications. This study deals with the reduction of spasticity through sustained stretching for elbow flexors in order to maximize the elbow function for functional use.

Aim and objective: This study deals with the management of elbow flexors spasticity through sustained stretching maneuvers in order to maximize the function and minimize the disability in the upper extremity.

Methodology: Quasi-experimental study design was used. Patients suffering from stroke were selected and underwent pre-test and post-test and assessment for the spasticity using Modified Ashworth Scale and Functional Ability Manual Ability Measure scale was used as outcome measures. Data collected statistically analyzed.

Results: The result of pre-test and post-test value of all the patients shows that mean value from 2.6 to 1.5 indicates improvement in the reduction of spasticity and mean value from 24.46 to 31.06 shows indicates improvement in the treatment of sustained stretching.

Conclusion: The findings of the present study support the use of sustained stretching in there by improved functional ability of elbow flexors spasticity on stroke patients.

Keywords: Elbow flexors spasticity, Sustained stretching, Functional ability

INTRODUCTION

Stroke is a sudden loss of neurological function caused by an interruption of blood flow to the brain. Neurological deficits are characterized by paralysis (hemiplegia) or weakness (hemiparesis) typically on the side of the body opposite to the side of the brain lesion. In stroke spasticity in one of commonest complication. It is the second most common cause of death and fourth leading cause of disability worldwide [1].

Prevalence

Men are more likely to have stroke than women. In India the male female ratio is 7:1. Incidence of stroke increases dramatically with age, doubling in decade after 65 years of age [2,3]. Among the survivors and estimated on third people will be functionally dependent after one year experiencing difficulties with activities of daily living, ambulation, speech and so forth. Spasticity has been defined as the motor disorder characterized by a velocity dependent increase in tonic stretch reflexes with exaggerated tendon jerk, resulting in hyper excitability of the stretch reflex, as one component of the upper motor neuron syndrome. Spasticity arises from injury to corticospinal pathways and occurs aspect of Upper motor neuron [4].

Syndrome

Loss of inhibitory control over motor neuron results in disordered spinal segmental reflex, including increased alpha motor neuron excitability, increases muscle spindle activity and flexor afferent excitability which leads to spasticity of muscle. Upper limb spasticity restricts the movement not only in the gross movement level but affects the finer movements of hand activities. So, addressing the management of the spasticity in the upper limb in one of the essential treatments for the stroke patients [5-7].

MATERIALS AND METHODS

Study was conducted in Saveetha Medical College and Hospital, Physiotherapy outpatient department, Saveetha

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University, Thandalam, Chennai-602105. Convenient sampling technique is used and 15 stroke patients were selected for the study. Patients were selected based on the inclusion criteria of patients with ischemic and hemorrhagic stroke and patients with during between 8 to 18 months, sub-acute and chronic CVA, range from MAS grade 1-3, medically stable cases, no history of previous neurological disorder, no pain or sensory involvement in the upper limb and patients who are ambulatory with assistive device. Exclusion criteria are based on MAS grade 0 and 4, onset of stroke is less than 8 months and more than 18 months [8]. Couch, pillows, towel and measurement charts were used as study materials. Detailed procedure was explained in patient's words, informed consent was obtained from all the participants. MAS is to measure the spasticity grading and MAM for functional ability of upper limb in participants [9]. The modified Ashworth scale is a six point rating scale that is used to measure muscle tone. The MAS measures resistance during passive soft tissue stretching. The MAS is done moving the limb at speed of gravity. This defined as the same speed a non-spastic limb would naturally drop. In other words, the test is done a maximum of three times for each joint [10]. If it is done more than three times, the short term effect of a stretch impacts the score. The Manual Ability Measure is an occupation based assessment because its terms are everyday occupational activities. The MAM has two versions one with 16 items another with 36 items. In this study the version of 16 items for the assessment of functional ability of upper extremity were used. Pretest measurement procedure of MAS it is performed in supine position. Elbow: in full flexion and forearm in pronation followed by extension of hand and wrist with supination of forearm and elbow extension.

Position and treatment

The patient position is supine on bed with supported. The therapist is in walk standing position. The therapist is grasping distal forearm with one hand and other hand stabilizes the scapula or anterior proximal humerus. Then therapist extend the hand and wrist with forearm is supinated and the elbow is extended. Extend the elbow just pass the point of tissue resistance to lengthen the elbow flexors. Then maintain this stretched position for 20 s for 10 repetition in a session. Posttest measurement is measured by MAS grading and MAM scale as pre pretest procedure.

RESULTS

The result of pre-test and post-test value (MAS) of all the patients shows that mean value from 2.26 to 1.5 indicate the improvement in reduction of spasticity **(Table 1, Figure 1)**. The result of pre-test and post-value (MAM) of this study shows that mean value from 24.6 to 31.06 shows indicate improvement in the treatment of sustained stretching **(Table 2, Figure 2)**.

Table 1. MAS Scale.

Patients (15)	Pre-test	Post-test
Mean value	2.26	1.5

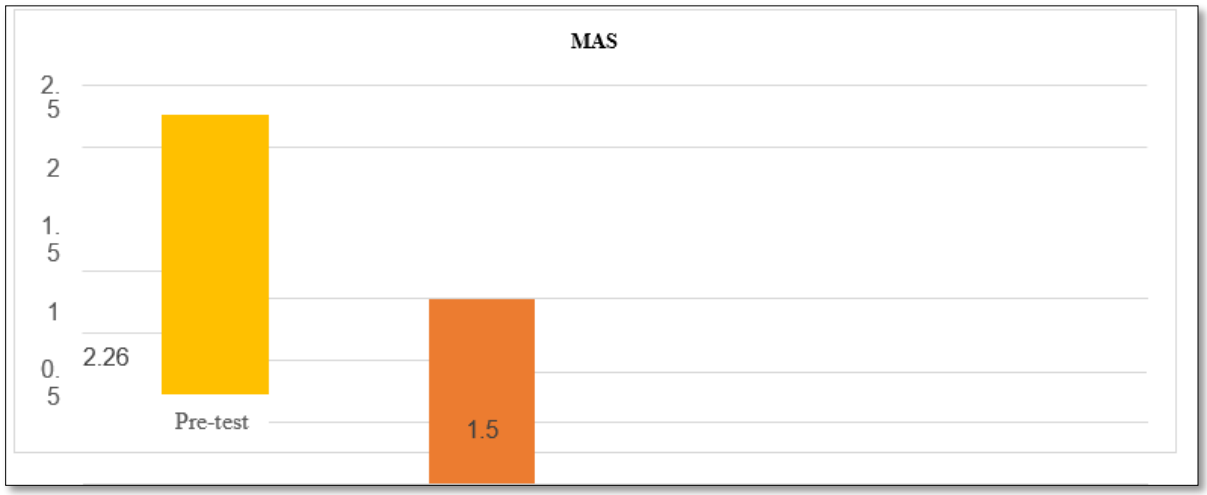

Figure 1. MAS scale.

Table 2. Manual ability measure scale.

Patients (15)	Pre-test	Post-test
Mean value	24.46	31.06

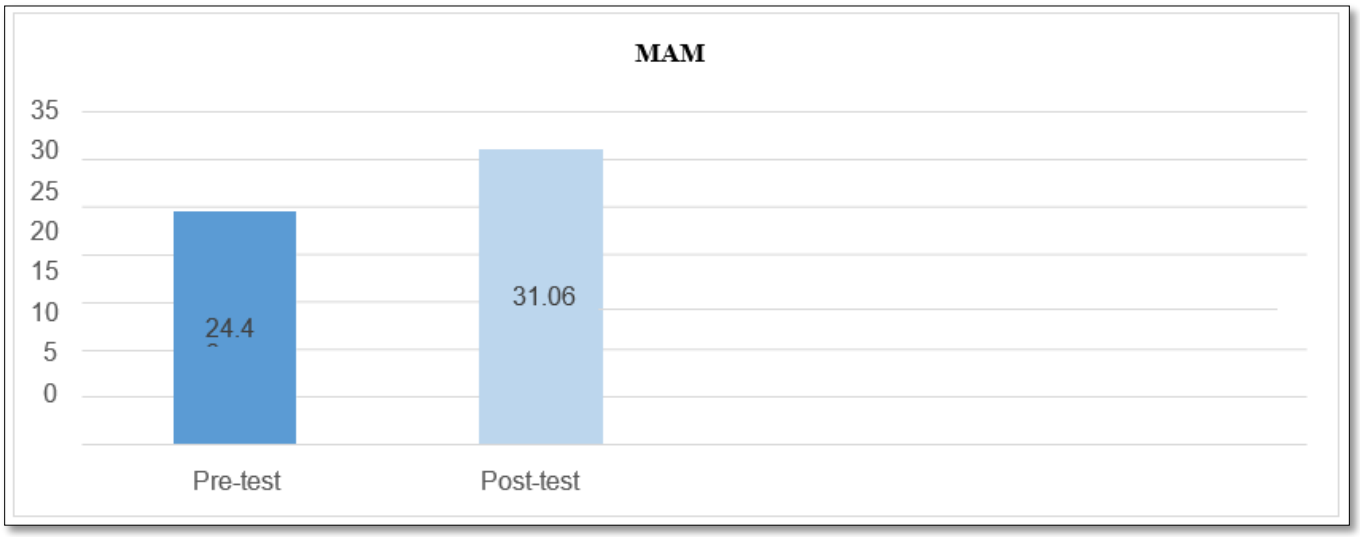

Figure 2. Manual ability measure scale.

DISCUSSION

This study deals with the reduction of spasticity through sustained stretching for elbow flexors in order to maximize the elbow function for functional use. In patients with stoke upper extremity spasticity is frequently strong in scapular retractors , shoulder girdle depressors adductors and internal rotators elbow flexors fore arm pronators wrist and finger flexors [11,12]. Skeletal muscle consists of sensory nerve fiber, i.e., Ia fiber and Ib fiber. Ia fiber which is innervated to muscle spindle responsible for changes in the length of the muscle fiber and detects how much muscle fiber stretched and send this information to higher center whereas Ib fiber which is innervated in GTO is responsible for change in tension of muscle. The mechanism of reduction in spasticity in sustained stretching is autogenic inhibition on muscle through the golgi tendon organ that located near the musculotendinous junction, which wraps around the ends of the extrafusal fibers of a muscle. The golgi tendon organ (GTO) is a protective mechanism that inhibits contraction of the muscle in which it lies. It has a very low threshold for firing after an active muscle contraction has a high threshold for firing with stretch. When excessive tension develops in the muscle, the GTO fires through Ib fibers and inhibits alpha motor neuron activity and thereby decrease the tension in the muscle that leads to reduction of spasticity. During stretching procedure a tension within the tendon determines if individuals sarcomere in muscle are lengthened. During stretching procedure passive tension will be developed in the muscle that will fire the GTO, inhibits the alpha motor neuron activity and decrease tension in the spastic muscle. In this study, after 3 weeks of sustained stretching maneuvers majority of the patients had shown improvement in reduction of elbow flexors spasticity thereby upper extremity functional activities have also been improved.

CONCLUSION

In the study the patients show the improvement in reduction of spasticity in elbow flexors through sustained stretching thereby improved functional ability of upper extremity.

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