THE EFFECTIVENESS OF SUSTAINED STRETCHING IN POST STROKE UPPER LIMB SPASTICITY

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Abstract

Objective: To establish the effectiveness of sustained stretching in reduction of post stroke upper limb spasticity.

Methods: A case series of 8 weeks duration with 5 sample size was conducted on home based patients in Islamabad and Rawalpindi. Case series describing the outcomes of individual patients with spasticity were treated with sustained stretching. The post-treatment effectiveness of stretching protocol was assessed by reference to the pre-treatment Modified Ashworth Scale (MAS), passive range of motion (ROM) on fortnightly basis. Five stroke patients aged between 45 and 65 years with spasticity were included in this case series. All patients were treated with sustained stretching from 1 to 2 minutes, 12 times per session four times a week to minimize spasticity.

Results: It was observed that spasticity decreased in two out of five cases with fair improvement on Modified Ashworth Scale (MAS), passive range of motion (ROM). Two out of 5 patients improved with MAS score from 2 to +1. While only one patient showed improvement in passive ROM.

Conclusion: The findings of this study suggest that sustained stretching plays a little role in reduction of spasticity in terms of improvement in range of motion (ROM) and improvement on Modified Ashworth Scale (MAS). Although, there were certain limitations because of small sample size however, further research is needed such as RCTs to generalize the results.

Key Words: Stroke, Spasticity, Upper Motor Neuron Syndrome (UMNS), sustained stretching (SS), Range of motion (ROM) and Modified Ashworth Scale (MAS), CVA, MCA syndrome.

Introduction

Spasticity, a type of hyper tonicity is an increase in muscle tone owing to the hyperexcitability of the stretch reflex and is characterized by a velocity-dependent increase in tonic stretch reflexes. (1) Spasticity usually accompanies paresis and other signs, such as increased deep tendon reflexes, collectively called the upper motor neuron syndrome, UMNS. Paresis particularly affects distal muscles, with inability to perform isolated movements of the digits. The upper motor neuron syndrome results from an insult to descending motor pathways at cortical, brainstem, or spinal cord levels, and spasticity develops gradually in days and weeks after injury. In acute phase of upper motor neuron syndrome, muscle tone is flaccid with hyporeflexia before the appearance of spasticity. The interval between injury and the appearance of spasticity varies from days to months according to the level of the lesion. In addition to weakness and increased muscle tone, the signs in upper motor neuron syndrome include clonus, the clasp-knife phenomenon, hyperreflexia, the Babinski sign, flexor reflexes, and flexor spasms. Spasticity is measured on a scale called Modified Ashworth Scale.

Stretching, the process of elongation, is one of the currently used techniques in the physical management of spasticity (2, 3). Mechanically applied Stretches (i.e., with a dynamometer or an intelligent feedback-controlled device) offer well controlled
interventions. Manual stretching is more difficult to standardize but suits clinical practice better. During stretching, tension is applied to soft-tissue structures \(^{(4)}\). They are muscle, tendon, vascular, dermal, and neural tissues \(^{(2)}\). It is important to know that a particular stretching exercise can apply tension to different structures in different people, especially in patients with deformities. Stretching may change the muscle’s viscoelastic, structural, and excitability properties. \(^{(3)}\) However, many neural and nonneural responses to stretch, especially in spasticity are yet to be clearly understood. The aims of stretching in spasticity may be to normalize muscle tone, to maintain or increase soft-tissue extensibility, to reduce pain and to improve function. \(^{(3)}\) Stretching programs for people with spasticity are usually used as a daily or weekly regimen over a long-term placing large demands on resources. Stretching as a treatment can vary in a large number of ways. The intensity of the stretch is the amount of tension that is applied to the structure(s), which not only can be different in force level but can also be kept either constant or can be varied. The velocity of the stretch is the speed at which the elongation is occurring. Repetitions are the number of replications of the stretch within 1 session. \(^{(4)}\) Static, dynamic, prolonged, and ballistic stretching are used in the stretching literature. In static (sustained) stretching, there is usually only 1 repetition, whereas in dynamic stretching there are more than 1 repetition. The duration is the period the structures are elongated within 1 repetition. The dose can be considered to be the total end range time; in other words, the total time structures are elongated. The frequency is the periodicity of the stretch, which can vary from a single session to daily sessions for several weeks.

**Methods**

Stroke patients of case series study were seen and given therapy at their homes in Islamabad and Rawalpindi. The time span of the study consisted of two months i.e. from February 2011 to April 2011. Convenient sampling method was used in selecting five stroke patients having inclusive criteria characteristics. Stroke patients, male and female aged between 45 and 65 years, who had had stroke attack at least 3 months before the start of the study, taking no medications except those drugs merely concerned with their morbid and comorbid conditions, were included in the study. Selected stroke patients had not been involved in any stretching program before this study. Stroke patients, male and female having ages below 45 and above 65 years were not included in the study. (Young stroke, a stroke in which patient age is below 45 years). Patients taking anti spasmodic or other medications of the same action even matching the age inclusion criteria were not included in the study. An assessment form was used for subjective data. Modified Ashworth Scale (MAS) was used as an assessment tool for spasticity and reassessment tool for reduction in spasticity.

![Figure 1](https://via.placeholder.com/150)

**Figure 1**

Patient’s data at the start of the study
Patients’ spasticity data measured on fortnightly basis

Discussion

The results of this study showed that sustained stretching can hardly reduce upper limb spasticity in stroke patients. All the cases were of ischemic left CVA. (MCA syndrome). Sustained stretching has a very little role in reduction of spasticity in stroke patients.

In this case series total five cases were included in which two patients were female and three male. The patients’ average age was 54.6 years. The male patients’ average age was 52 years while female patients’ average age was 58.5 years.

During this study sustained stretching was applied to five stroke patients with mild to severe upper limb spasticity. Every patient was treated for two months (8 weeks) at his/her home.

In five cases, one case was mild, with mild spasticity, one was severe with severe spasticity and the remaining three cases were of moderate nature, with moderate spasticity.

Modified Ashworth Scale (MAS) was used for assessment, reassessment and reevaluation of spasticity.\(^5\) Two out of three moderate cases showed improvement on Modified Ashworth Scale (MAS). One case did not show any improvement on MAS. Improvement in passive ROM was noted in one of the moderate cases which also showed improvement on Modified Ashworth Scale. Both the severe and mild cases failed to show any improvement on modified Ashworth Scale and improvement in passive ROM.

Out of five patients, two patients (one male and one female) showed fairly improvement in their spasticity with sustained stretching. It was observed that sustained stretching has a little role in reduction of upper limb spasticity in stroke patients.

Case-1: The results of this case were analyzed in terms of reduction in spasticity on Modified Ashworth Scale (MAS). The patient spasticity was measured on fortnightly basis. At the end of the 2nd week no improvement was observed in patient’s spasticity, at the end of the 4th week patient spasticity did not show any change, at the end of the 6th week patient’s spasticity was found to be reduced when reassessed on MAS. At the end of this study no further changes were observed in the spasticity of this patient. This case showed the effect of sustained stretching in reduction of spasticity. This case study is supported by a study on “Reduction of Elbow Flexor and Extensor Spasticity Following Muscle Stretch” by Z M AL-ZAMIL Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia, N. Hassan, Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia and W. Hassan, Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia. The study concluded that by using sustained stretching of the spastic muscles one or several times a day, spasticity can be diminished to a level to facilitate voluntary movement and improve EMG profiles during voluntary movement.\(^5\).

Case-2: The results of this case were analyzed in terms of reduction in spasticity on Modified Ashworth Scale (MAS). The patient’s spasticity was
measured on fortnightly basis. At the end of the 2nd week no improvement was observed in patient spasticity, at the end of the 4th week patient’s spasticity was found to be reduced when reassessed on MAS, at the end of the 6th week patient spasticity did not show any changes. At the end of this study no further changes were observed in the spasticity of this patient. This case showed the effect of sustained stretching in the reduction of spasticity. This case study is supported by a study on “Reduction of Elbow Flexor and Extensor Spasticity Following Muscle Stretch” by Z.M. AL-Zamil, Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia, N. Hassan, Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia, and W. Hassan, Rehabilitation Department, College of Medical Applied Sciences, King Saud University, Riyadh, Saudi Arabia. The study concluded that by using sustained stretching of the spastic muscles one or several times a day, spasticity can be diminished to a level to facilitate voluntary movement and improve EMG profiles during voluntary movement. (6)

Case-3, 4 and 5: The results of these cases were analyzed in terms of reduction in spasticity on Modified Ashworth Scale (MAS). The patients’ spasticity was measured on fortnightly basis. During the two month course of these cases no change had been observed in the spasticity of patient with sustained stretching. This case is supported by a study on “Effectiveness of Stretch for the Treatment and Prevention of Contractures in People With Neurological Conditions” by Owen M. Katalinic, Lisa A. Harvey and Robert D. Herbert. The purpose of this systematic review was to determine the effectiveness of stretch for the treatment and prevention of contractures. The review included randomized controlled trials and controlled clinical trials of stretch applied for the purposes of treating or preventing contractures in people with neurological conditions. The study concluded that regular stretch produces negligible clinically important changes in joint mobility, pain, spasticity, or activity limitation in people with neurological conditions. (6)

In a nutshell the result of this study showed that sustained stretching can hardly reduce upper limb spasticity in stroke patients. Sustained stretching has a very little role in reduction of spasticity in stroke patients.

Conclusion

After the completion of this research study it is concluded that sustained stretching plays a little role in the management of spasticity. During this case series all the five cases were treated with sustained stretching and got inconclusive results. The results of this study are also supported by a number of other research studies. Although, there were certain limitations because of small sample size however, further research is needed such as RCTs to generalize the results

References

