

# “Neural Tension Among Hemiplegic Subjects”- A Cross-Sectional Study

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## ABSTRACT

**AIM:** This study was performed with the aim to know if there will be any change in the neural tension of the peripheral nerves following hemiplegia. The study analyzed the status of neural tension in radial, median, ulnar nerves following stroke

**METHODOLOGY:** 30 individuals in post-stroke condition were selected based on inclusion and exclusion criteria. Detailed procedure was explained in the subject's words and those who are interested; informed consent was obtained from all the participants. Complete neurological assessment was done. The subject was positioned in a supine position at lateral end of the couch in a diagonal manner. Upper limb tension testing 2 and 3 was tested on both the upper limbs of the subject. The positive and negative test results of the ULTT will be analyzed for the three major nerve of upper limb.

**RESULT:** There were seven subjects positive with neural tension in upper limb out of thirty samples taken. There were 4 subjects with positive ULTT2a, 2 subjects with ULTT2b and 3 patients with ULTT3 positive.

**CONCLUSION:** From this study, we conclude that neural tension is not a regular phenomenon in stroke hence it can be generalized as a treatment protocol for all the stroke subjects. This study also concludes that median nerve and ulnar nerve are the mostly affected in subjects tested positive for neural tension.

**Keywords:** Neural Tension, Hemiplegia, Stroke.

## INTRODUCTION

Stroke is a focal neurological deficit causing secondary motor dysfunction. It is an important cause of disability and death especially in middle income countries like India where the rural rehabilitation is poor and underdeveloped. There are one million cases per year. As the related death and DALY's lost is increasing causing burden on the country. The burden is expected to rise as 36% of total death by 2030. National program for prevention and control for stroke and other non-communicable diseases were started by Ministry of health and family welfare of India on 4th January 2008. World Health Organisation has a target of 25% reduction of CVA by 2025. The better rehabilitation gives a better life after stroke. There is a need for better strategies that relates to recovery and a better approach to neurorehabilitation. The scope of the research is to work on better therapeutic strategies to restore function by minimizing impairment. The concept of tight nerves dates back to 19th century (John Marshall 1883) when they were performed on basis of neurophysiology and pain. Physical loading (tension or compression) of the nervous system can be produced by Adjusting joint position. In 1970s its significance entered manual therapy. There were publications of David butler and Michael Shacklock which

directed the neural approach. According to David Butler, In CVA when neural tissues are attempting to recover function, tension on the nervous system should be minimized to allow better recovery. The effect of flexor spasticity has been causing ulnar nerve vulneration in Butler's view. The incidence of peripheral nerve injuries in traumatic brain injury was studied (Stone L). The neuropathies commonly were found in the neurologically impaired extremity and associated with spasticity. The improper positioning of the paralyzed patients can cause the neural tension due to prolonged stretch. There have been recent studies relating to the effectiveness of neural mobilization techniques in stroke patients. If there is effectiveness in neural mobilization, is there neural tension present in the nerves of the stroke subjects?

#### **METHODOLOGY: -**

The study was designed as a cross-sectional study in three private clinics in Chennai. A convenient sampling technique with 30 post-stroke subjects. The subjects with Post-stroke hemiplegia, both spastic and flaccid paralysis, all age groups, all genders, and Subjects clinically diagnosed by the neurologist as having a stroke were selected. Subjects with Sensory impairment, Noncomprehensive, Restricted shoulder ROM, History of joint dislocation, and Fractures were excluded from the study.

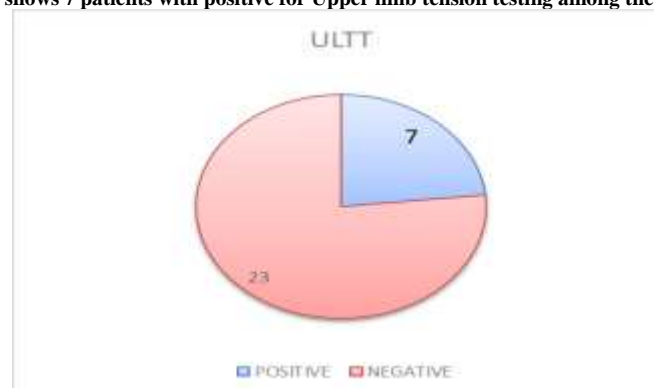
#### **PROCEDURE**

30 individuals in post-stroke condition were selected based on inclusion and exclusion criteria. The detailed procedure was explained in the subject's words and those who were interested; informed consent was obtained from all the participants. A complete neurological assessment was done. The subject was positioned in a supine position at the lateral end of the couch in a diagonal manner. Upper limb tension tests 2 and 3 were tested on both the upper limbs of the subject. Upper Limb Tension Testing 2. (a) Median nerve dominant utilizing shoulder girdle depression and external rotation of the shoulder. (b) Radial nerve dominant utilizing shoulder depression plus internal rotation of shoulder. 3. Ulnar nerve dominant utilizing shoulder abduction and elbow flexion. Continuous monitoring of neurological signs was done. The procedure was terminated if worsening of neurological signs, dizziness and circulatory disturbances seen. There will be special consideration given for associated diabetes, Guillain-Barre syndrome, multiple sclerosis, recent surgeries and other medical conditions of nervous pathologies. The response for the respective tests was observed and documented.

#### **DATA ANALYSIS**

The positive and negative test results of the ULTT have been analyzed for the three major nerve of upper limb.

GRAPH-1 pie chart shows 7 patients with positive for Upper limb tension testing among the 30 taken post subjects.



GRAPH: 2 bar diagram showing the different upper limb tests positive among those seven positive subjects.



## RESULT

There were seven patients positive with neural tension in upper limb out of thirty samples taken. There were 4 subjects with positive ULTT2a, 2 subjects with ULTT2b and 3 subjects with ULTT3 positive.

## DISCUSSION

This study was done to analyze the presence of neural tension in stroke subjects which is an unexplored area of neural biomechanics. In David Butler's neural mobilization concept, very few mentioning of stroke is found. Hence there is no clear explanation regarding the neural tension in stroke. Few studies have been done in the past on neural tension and stroke but the majority if these studies have concentrated on using ULTT as an intervention tool and analyzed its efficacy on the upper limb function. There are very few studies describing the actual neural tension mechanism in stroke. Hence this study made the effort to find the neural tension in stroke and the factors determining them. As the neural tension tests were done in 30 post-stroke subjects, seven subjects were positive for neural tension tests. There was a neural tension assessment done in upper extremity in according to David butlers book's observation. As the study findings are similar to the findings by Carolyn byl, ms, Christian Puttlitz, PhD, et al which states that improper positioning leading to strain in median and ulnar nerve as in our study ulnar and median nerve are

predominantly affected. As the butlers reference to antalgic posture in his book there were 10subjects with antalgic posture. Only three subjects with antalgic posture had positive ULTT. Median and radial affected in a subject and radial, median nerve each in subjects. According to, stone L Keenan the neuropathies commonly were found in the neurologically impaired extremity and associated with spasticity. There were 11 patients with spasticity in 30 post stroke subjects. only 2 subjects with spasticity had positive ULTT. Both were positive for median nerve (ulTT2a). The effect of flexor spasticity has been causing ulnar nerve vulneration in butlers view but all three subjects with ULTT 3 positive had normal tone. There was special consideration for associated nervous pathologies like diabetes there were 6 type 2 diabetic subjects in the study 2 subjects were positive for ULTT2a and ULTT3 subsequently. According to David butler in CVA when neural tissues are attempting to recover function, tension on the nervous system should be minimized to allow better recovery. There are many studies stating that therapeutic efficacy of neural mobilization technique in stroke subjects but the state of tension has not been discussed. This study states that the ULTT can be done in post stroke subjects with practical difficulties like 29 comprehension deficit patients

The intravenous line interferes during the test and builds up contractures which limit the movement. This study states that it is possible to analyze neural tension in post-stroke subjects which opens the door to further studies in the future. It also proves that neural tension abnormalities exist in post-stroke subjects. This study should also be done in the lower extremity. There needs to be further study on the cause of the increase in neural tension and its correlation with other properties of stroke. There is a need for a study on the effect of neural tension on the functional recovery of stroke subjects.

The shortcomings of the study are fewer sample subjects. Due to feasibility reasons, the number of subjects was limited (less study duration). The study should have been done on a given day after the stroke. The period after stroke has influenced neural tension development. Hence longitudinal study rather than a cross-sectional study will suit the analysis of neural tension following a stroke. The use of standardized tools like EMG will help the researcher to give precise knowledge. The levels of spasticity should have been considered while assessing the determinants. The functional component which was emphasized by butler is missing in this study which can be a scope for future studies.

The major strengths of the study are it's dealing with a rare problem that is not explained in detail in past literature. It also attests to a major problem in neurological rehabilitation which is stroke. There are many scopes for future study. The study can be analyzed in the lower limb, the study can be repeated in a more number of samples, and the difference in neural tension between acute and chronic stages of stroke, right and left side, male and female, ischemic and hemorrhagic stroke can be analyzed.

#### **Declaration by Authors**

**Ethical Approval:** Approved

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**Conflict of Interest:** The authors declare no conflict of interest.

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