

## “Utilization of Semmes-Weinstein Monofilament Test & two Point Discrimination Test to Understand The Effect of Sensory Re-Education After Median Nerve Repair in Hand Injury Cases”



### Medical Science

**KEYWORDS :** Semmes- Weinstein Monofilament test and Two-point discrimination test –for assessing the sensory changes in the nerve injury patients

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### ABSTRACT

*AIM OF THE STUDY: To prove the effectiveness of Sensory re-education to minimize the discomfort & improve the sensibility on hand after the median nerve repair.*

*OBJECTIVES OF THE STUDY: To study the effectiveness of sensory re-education on peripheral nerve injuries of the hand (after median nerve repair). To measure the effectiveness of sensory re-education using Semmes-Weinstein monofilament test & Two-point discrimination test.*

*MATERIAL & METHOD: Sample of 15 median nerve repaired patients were selected through convenient Sampling method based on the inclusion criteria, which include sensory re-education technique, monofilament test & two point discrimination test. They were instructed to carry out treatment in home 4 times/day for a period of 6 months. The patients were evaluated at the beginning & at the end of the rehabilitation using the Semmes-Weinstein monofilament test & Two-point discrimination test. The statistical analysis was made using paired “t” test.*

*RESULT & CONCLUSION: The statistical Significance results were observed in the Filament Test (t value= 10.62, P< 0.05) & Two Point Discrimination test (t value = 12.63; P< 0.05). The study shows significant effect of Sensory re-education on peripheral nerve injuries of the hand (after the median nerve repaired) to minimize the discomfort & improves the sensibility of the hand.*

*From this study it can be concluded that patients with discomfort & sensory loss would benefit from sensory re-education technique.*

### INTRODUCTION:

- Human hand is a remarkable instrument capable of performing countless actions. It provides the cerebral cortex with information regarding thickness and distance and this is responsible for the development of visual appreciation of texture, weight and temperature. By itself hand is able to recognize on object by the eye.
- Semmes-Weinstein monofilament is a set of nylon filament of various diameter and constant length set at a right angle in acrylic handles, used for testing the threshold of touch sensation.
- Two point discrimination is a test of the quality of sensation, it consist two types, that is static two point discrimination and Moving two point discrimination. It measures the innervations of density of the slowing adapting fibers and quickly adapting fibers.
- Sensory reeducation is a method by which the patient learns to interpret the pattern of abnormal sensory inputs generated after an interruption in the peripheral nervous system.

### STATEMENT OF THE STUDY

- Utilization of Semmes-Weinstein monofilament test and Two-point discrimination test to understand the effect of sensory re-education after median nerve repair in hand injury cases.

### NEED OF THE STUDY

- Hand injuries form of a major part of rehabilitation unit resulting from peripheral nerve injuries.
- Sensory re-education is a method the patient learns to interpret the peripheral nervous system. To help the patient with rehabilitation the patient is trained to recognize the altered sensory feedback to the brain and interpret the sensory stimuli.

### AIM OF THE STUDY

To prove the effectiveness of sensory re-education to minimize the discomfort and improve the sensibility on hand after median nerve repair.

### OBJECTIVES OF THE STUDY

- To study the effectiveness of sensory re-education on peripheral nerve injuries of the hand (after median nerve repair).
- To measure the effectiveness of sensory re-education using Semmes-Weinstein monofilament test and Two point dis-

crimination test.

### HYPOTHESIS

- The sensory re-education is an effective tool for peripheral nerve injuries of the hand after the median nerve repair using Semmes-Weinstein filament test and Two-point discrimination test.

### RESEARCH DESIGN

It was a true experimental pre and post- test design.

### INCLUSION CRITERIA

- Median nerve injuries of the hand patients were selected.
- Subjects either male or female patients were selected.
- Subjects within the age group 20 to 40.

### EXCLUSION CRITERIA

- Diabetic neuropathy hand.
- Hansen's disease

### POPULATION

Post operative peripheral nerve injuries of the hand patients in the age group of 20 to 40 years.

### SAMPLE AND SAMPLING TECHNIQUE

Sample of 15 median nerve repaired patients were selected through convenient sampling technique based on the inclusion criteria.

### VARIABLES

#### DEPENDENT VARIABLE

- Sensation
- Semmes-Weinstein monofilament test.
- Two point discrimination test.

#### INDEPENDENT VARIABLE

- Sensory re-education

### STUDY SETUP

This study was conducted in Ganga Hospital- Coimbatore, Deiva Hospital-Thanjavur, and Thanjavur Medical College Hospital.

### METHODOLOGY:

#### SENSORY RE-EDUCATION TECHNIQUES

Recovery is not just a process of re-innervations but it also in-

volves cortical re-education of the interpretation of altered signals from the periphery (Nishikawa and Smith 1992).

Wynn Parry & Salter(1976) believed that sensory re- training should be in I routine part of rehabilitation after median nerve suture.

**TECHNIQUES:**

**PRE EARLY PHASE**

- Eraser end of pencil to move up and down.
- Localization of smaller and lighter stimuli until he can localize stimuli that is close to the level of his touch.

**EARLY PHASE**

**CONSTANT TOUCH**

- 30 cycle per seconds by vibration

**MOVING TOUCH**

- By using vibration (30 cycle per seconds)

**MIDDLE PHASE**

- Initially patients may be asked to tell whether two objects are heavy or light.
- Later, the patients should be able to identify the objects or their texture to prove the efficacy of sensory re-education.
- On progress the objects with greater differences in size, shape and texture to those with more subtle difference were used to fine tune perception skills.

**Initially**

- Placement of objects in the patient’s hand.

**Later**

- Increase the number of objects to choose from in a matching task, progress from three-dimensional objects to two-dimensional objects

**LATER PHASE**

- Identification of tasks and further graded by beginning with large objects with greater differences in size-shape texture.

**PROCEDURE:**

**Pre early phase:**

- Touch generalization
- Touch localization
- Sensory re-education

**Early Phase:**

Moving vibratory stimulation (30 cycle per second) without moving vibratory stimulation

**Middle phase:**

**Grade from**

- Hard objects to soft one
- Heavy object to light ones
- Unipole to multipole
- Constant touch is maintained

**Late phase**

Identification of large to small objects

Utilizing a tabulated Performa ,scales of interpretation of monofilament and two point tactile discrimination were used for assessing the efficacy of sensory reeducation.

**MATERIALS USED IN THE STUDY**

Semmes Weinstein monofilament (nylon wire) device

Two point discrimination device

Transcutaneous vibratory stimulator

**SENSORY RE-EDUCATION KIT**

- Cotton, eraser end of pencil
- Texture of dowels
- Brush
- Large objects to smaller objects
- Heavy to light objects
- Texture discrimination using Sandpaper and Fabrics
- Nut, bolt washes, tapes

**OBSERVATION AND DATA ANALYSIS**

The descriptive analysis as mean, standard deviation and mean difference. The interferential analysis such as paired “t” test. Pre and post score plotted by graphical and diagrammatic representation.

**TABLE 1 - Representing the Mean and SD of Pre test scores of Semmes -Weinstein monofilament and Two Point Discrimination.**

Scale	Pre test		Post test	
	Mean	SD	Mean	SD
Semmes Weinstein Monofilament test	0.6	0.6324	2.5	0.839
Two point Discrimination test	0.6	0.6324	2.5	1.125

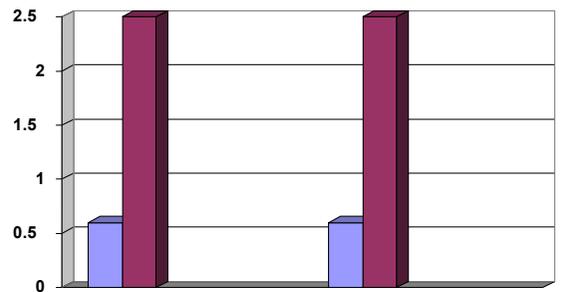
**Table 2 - Representing the paired‘t’ test values of Semmes-Weinstein monofilament and Two Point discrimination.**

Scale	t-value	Results
Semmes Weinstein Monofilament	10.68*	Significant
Two point Discrimination	12.63*	Significant

\*Significant at 5%(ie.,p<0.05 level)

**Figure 1**

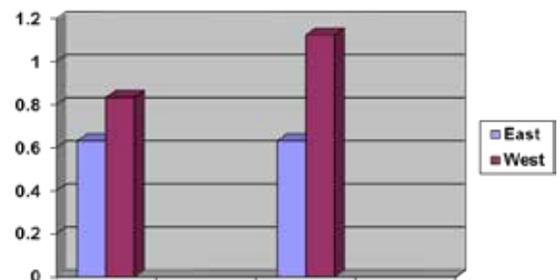
Mean of Pre and Post Test Score for Filament score and Two Point Discrimination Score



Pre test Post test  
Filaments Score                      Pre test Post test  
Two Point Discrimination score

**Figure 2**

Standard Deviation of Pre and Post test for Filament score and Two Point Discrimination score



Pre test Post test                      Pre test Post test  
Filaments                                      Two Point Discrimination score

## RESULTS AND DISCUSSION

This study was done to prove the effectiveness of Sensory re-education to minimize the discomfort and improve the sensibility of the Hand.

Mean value of Semmes-Weinstein Monofilament pre & post

test score and two- point discrimination pre & post test score for sensory re-education training shows significant difference in improvement.

In the paired 't' test value of pre & posttest score shows significant difference in both Semmes- Weinstein Monofilament scale & Two point Discrimination scale.

- In the mean value of post test score were highly significant difference than pre test score.
- So these results show the sensory re-education technique was effective on peripheral nerve injuries of the hand (after the median nerve repaired).
- This is supported by the previous studies done by Dellon Jabaly (1982). Own results follows sensory re-education recorded achievement of sensation.

## LIMITATIONS OF THE STUDY

- As the study was conducted on small sample size, the result cannot be generalized.
- Associated injuries will also have their influence.
- Other factors like age, gender etc, may also have influence on improving the sensation.

## SCOPE FOR FUTURE STUDY

- Similar studies can be conducted combining with other splinting techniques.
- Similar studies can be conducted either on dominant or non-dominant hand

## CONCLUSION

- With the limitation of the study the following conclusion was drawn from result obtained.
- Hand sensibility in the Median nerve distribution improved with Sensory re-education technique..

## REFERENCES

1. Occupational therapy- Trombley
2. Hand rehabilitation - Hunter
3. Occupational therapy- Pedretti
4. Examination of the Hand and Wrist – Raoul Tubian, MD.
5. Hand Rehabilitation – Gaylord, Clark, MD.
6. Hand condition – W. Bruce Conolly
7. Hand Rehabilitation – Nancy Falkenstein, Susan Weiss Lessard
8. Concepts of Hand Rehabilitation – Barbara G. Stanley