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The effect of neural tension technique versus neural sliding technique on pain and functional disability in cervical radiculopathy: A comparative study

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Abstract

Background: Neural mobilization techniques are widely used to evaluate, and improve the mechanical and neurophysiological integrity of peripheral nerves in clinical populations. This techniques includes combination of joint movements that promote either neural tensioning (through displacement of nerve endings in opposite directions), or sliding (through displacement of nerve endings in same direction).

It is a movement-based therapy, applied manually or via exercise. The nerve is mobilized relative to adjacent structures, with the aim of reducing symptoms through mechanisms that may be mechanical or neurophysiologic.

Aim and Objectives: To determine the better treatment option between neural tension technique and neural sliding technique on pain and functional disability in patients with cervical radiculopathy.

Methods: Total 30 subjects had been participated in the study according to inclusion criteria, and then divided them into two groups (Group A and Group B). Outcome measure neck disability index, numerical pain rating scale and patient specific functional scale were taken before treatment. Group A was given neural tension technique and Group B was given neural sliding technique. After treatment outcome measure was taken. Statistical analysis was done by post outcome measures of both the techniques.

Result: Subjects in the neural tension technique group showed more improvement than neural sliding technique group. Thus neural tension technique has more significant effect on reducing Edema, hypoxia and other associated symptoms. In this way, it shows the improvement in numerical pain rating scale, Neck disability index and patient specific functional scale.

Conclusion: Based on the findings of the present study concludes that the neural tension technique is more effective than neural sliding technique in the reduction of pain and functional disability.

Keywords: Neural Tension; Neural Sliding; Cervical Radiculopathy; Neck Disability Index; Numerical Pain Rating Scale; Patient Specific Functional Scale

1. Introduction

Neck pain is a common musculoskeletal complaint and is often associated with shoulder or arm pain. There is a paucity of information on effective treatment for neck and arm pain, such as radiculopathy or cervico-brachial pain. The patients with arm and neck pain are more disabled than the patient with only neck pain "[1]."

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The overall prevalence of neck discomfort in the general population is between 0.4 percent and 86.8% (mean: 23.1 percent); point prevalence is between 0.4 percent and 41.5 percent (mean: 14.4 percent); and one-year prevalence is between 4.8 percent and 79.5 percent (mean: 25.8 percent) "[2]."

Nerve compression caused by herniated disc material or arthritic bone spurs is known as cervical radiculopathy. Neck and radiating arm discomfort or numbness, sensory impairments, or motor dysfunction are common symptoms of impingement in the neck and upper extremities "[3]."

Neurodynamics refers to the communication between different parts of the nervous system and to the nervous systems relationship to the musculoskeletal system. It has been shown that the nerves move independently from other tissues. The term Neurodynamics first made an appearance in 1989 and has since been further developed over the last 30 years. Neurodynamics is now seen as an important part of injury assessment and treatment.

The brain, spinal cord and nerves are continuous and are surrounded by connective tissue which can develop tension or tightness, often contributing to nerve symptoms experienced as radiating pain, numbness, tingling or weakness. Neural mobilization is a gentle nerve stretching technique to relieve this tension and its associated symptoms.

Neural mobilization techniques are widely used to evaluate, and improve the mechanical and neurophysiological integrity of peripheral nerves in clinical populations. This techniques includes combination of joint movements that promote either neural tensioning (through displacement of nerve endings in opposite directions), or sliding (through displacement of nerve endings in same direction) "[4]."

It is a movement-based therapy, applied manually or via exercise. The nerve is mobilized relative to adjacent structures, with the aim of reducing symptoms through mechanisms that may be mechanical or neurophysiologic "[5]."

In the past, neural tension was employed to indicate peripheral nervous system disorders. There has been a recent shift away from a strictly mechanical approach. Justification for including physiological concepts like structure with the neurological system's function the field of neurodynamics is now well-established. A more widely used word for the body's combined biomechanical, physiological, and morphological functions. Regardless of the underlying design, the nervous system must be able to adjust to mechanical demands and must go through discrete mechanical events. Elongation, sliding, cross-sectional change, angulation, and compression are only a few examples. The nervous system is prone to neural edema if these dynamic defensive systems fail.

The mobilization of the neural system as a method of physical pain therapy is referred to as neurodynamics in this context. The treatment and/or assessment rely on mechanical treatment of neural tissues and non-neural structures surrounding the nervous system to influence pain physiology. In nerve tissues, this mobilization triggers a variety of mechanical and physiological responses. Neural sliding, pressurization, elongation, tension, and alterations in intraneural microcirculation, axonal transport, and nerve impulse motions, for example.

1.1. Need of the Study

Neck pain (NP) is ranked as the fourth greatest contributor to global disability and the 21st in terms of overall burden "[6]."

There were many treatment options available for the cervicobrachial pain like manual therapy, stabilization exercise, electro modalities, and neural mobilization.

This study was aims to check the better efficacy between neural tension and neural sliding technique on pain and functional disability in patients with cervical radiculopathy.

There was no specific study has been done to check the better efficacy between neural tension and neural sliding technique in patient with cervical radiculopathy.

1.2. Hypothesis

1.2.1. Null Hypothesis (H_0)

There was no significant effect of neural tension technique versus neural sliding technique on pain and functional disability in cervical radiculopathy.

1.2.2. Experimental Hypothesis (H_1)

There was a significant effect of neural tension technique versus neural sliding technique on pain and functional disability in cervical radiculopathy.

Aim

To establish the effect of neural mobilization on the pain, function and quality of life of the patient with acute and sub-acute cervical radiculopathy.

Objectives

- To check the efficacy of neural tension technique on pain and functional disability in cervical radiculopathy.
- To check the efficacy of neural sliding technique on pain and functional disability in cervical radiculopathy.
- To check the better treatment option between neural tension and neural sliding technique on pain and functional disability in cervical radiculopathy.

2. Methodology

2.1. Type of the Study

Comparative Study

2.2. Duration of the Study

3 Months

2.3. Place of the Study

Cure Physiotherapy Clinic

2.4. Sample Size

30 Patients

2.5. Inclusion Criteria

- Age 18-65 Years“[7].”
- Neck Pain with Upper Extremity Pain, Parasthesia and Numbness[8]
- Positive Spurling Test“[8].”
- Positive Distraction Test“[8].”
- Upper Limb Tension Test Should Be Positive“[8].”

2.6. Exclusion Criteria

- Development of Systemic/ Degenerative Disease“[7].”
- Neck Pain Associated With Whiplash Injury“[7].”
- Medical Red Flag History (Tumor, Fracture, Metabolic Disease, Rheumatoid Arthritis“[7].”
- Patients who are taking pain killers.

2.7. Repetitions

6-8 Repetitions of Neural Mobilization

2.8. Sessions

4 Sessions/Week for 3 Weeks

2.9. Outcome Measure

- Neck Disability Index
- Numeric Pain Rating Scale
- Patient Specific Functional Scale

2.10. Method

Total 30 subjects had been participated in the study according to inclusion criteria, and then we divided them into two groups (Group A and Group B). Outcome measure neck disability index, numerical pain rating scale and patient specific functional scale were taken before treatment. Group A was given neural tension technique and Group B was given neural sliding technique. After treatment outcome measure was taken. Statistical analysis was done by post outcome measures of both the techniques.

2.11. Group 1 (Tension Technique)

2.11.1. Median Nerve

Shoulder Depression, Abduction 110, Elbow Extension Forearm Supination, Wrist Extension, Finger and Thumb Extension, Cervical Spine Contralateral Flexion

2.12. Radial Nerve

Shoulder Depression, Abduction 10, Medial Rotation, Elbow Extension, Forearm Pronation, Wrist Flexion and Ulnar Deviation, Finger and Thumb Flexion Cervical Spine Contralateral Flexion.

2.13. Ulnar Nerve

Shoulder Depression, Abduction (10-90), Lateral Rotation, Elbow Flexion, Forearm Supination, Wrist Extension and Radial Deviation, Finger Extension, Cervical Spine Contralateral Flexion.

2.14. Group 2 (Sliding Technique)

2.14.1. Median Nerve

Shoulder Depression, Abduction 110, Elbow Extension Forearm Supination, Wrist Extension, Finger and Thumb Extension, Cervical Spine Ipsilateral Flexion.

2.14.2. Radial Nerve

Shoulder Depression, Abduction 10, Medial Rotation, Elbow Extension, Forearm Pronation, Wrist Flexion and Ulnar Deviation Finger and Thumb Flexion, Cervical Spine Ipsilateral Flexion.

2.14.3. Ulnar Nerve

Shoulder Depression, Abduction (10-90), Lateral Rotation Elbow Flexion, Forearm Supination, Wrist Extension and Radial Deviation, Finger Extension, Cervical Spine Ipsilateral Flexion.

Median Nerve Mobilization (Neural Tension Technique)

Median nerve mobilization (Neural Sliding Technique)

Radial nerve mobilization (Neural Tension Technique)

Radial nerve mobilization (Neural Sliding Technique)

Ulnar nerve mobilization (Neural Tension Technique)

Ulnar nerve mobilization (Neural Sliding Technique)

Figure 1 Neural Tension Technique and Neural Sliding Technique for Median, Radial and Ulnar Nerve

3. Results

3.1. Statistical Analysis

Statistical analysis was done by statistical package for the social science(SPSS) statistical software version 28.0 graphs and tables were done by Microsoft excel.

3.2. Statistical Test

The normality of data was checked by using the Shapiro-Wilk test, which showed that the data is parametric type for Numerical pain rating scale, Neck disability index and Patient specific functional scale.

The level of significance (p- value) was set at the 0.05 level.

The paired t-test for intragroup analysis and unpaired t-test for intergroup analysis was used.

3.3. Data Analysis

Table 1 Age Distribution of Both Groups

AGE	MEAN	SD
GROUP A	43.93	12.78
GROUP B	39.60	14.82

The study involved 30 subjects with cervical radiculopathy. The result is presented for 30 patients (15 patients in Group A and 15 patients in Group B).

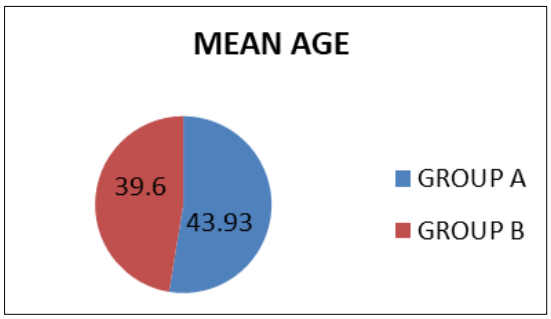

Figure 2 Mean age of the subjects in group A was 44 years whereas In group B was 39 years

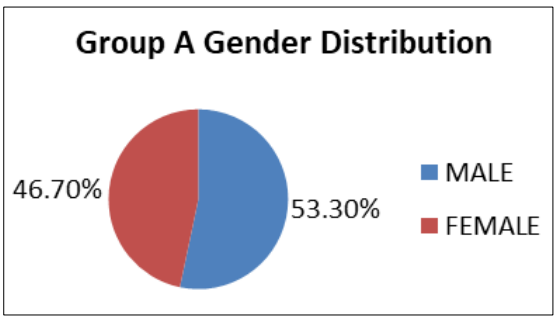

Figure 3 Total 46.70% subjects are female and 53.30% are male in Group A

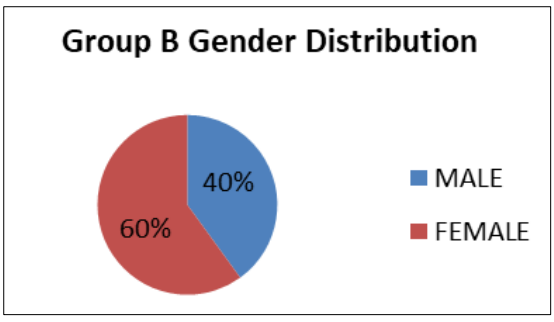

Figure 4 Total 60% subjects were female and 40% were male in Group B

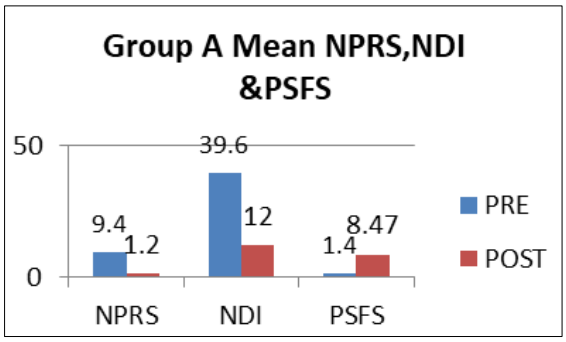

Figure 5 As per paired t-test data reflects that P- value is lesser than 0.05, this shows a significant difference in NPRS, NDI and PSFS in Group A

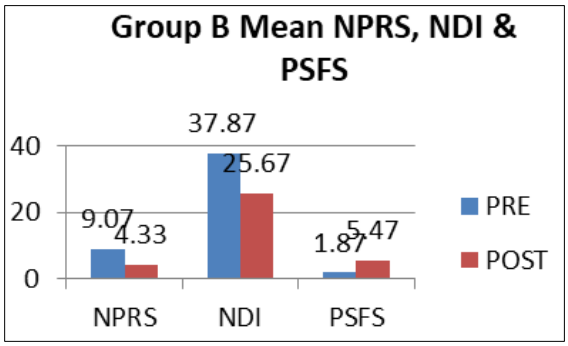

Figure 6 As per paired t-test data reflects that P- value is lesser than 0.05, this shows a significant difference in NPRS, NDI and PSFS in Group B

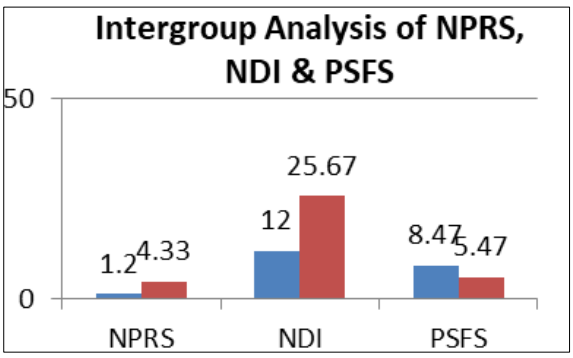

Figure 7 As per unpaired t-test data reflects that P- value is less than 0.05 this shows a significant difference between both groups

4. Discussion

The main purpose of the study is to evaluate the effect between neural tension Technique and Neural sliding technique on pain and functional disability in cervical radiculopathy.

Three outcome measures were taken Numerical pain rating scale, Neck disability index and Patient specific functional scale.

Finally the finding of the study suggests that although the improvement was seen in both groups. A greater amount of improvement was seen in group A (Neural tension technique) than group B (Neural sliding technique) after 3 weeks of intervention.

So based on the analysis of the result, the null hypothesis was rejected, which suggests that there was a significant difference seen in neural tension technique on pain and functional disability in cervical radiculopathy subjects.

The concept of nerve tension plays a major role in formulating a treatment plan for nerve mobilization. Tissue mobility, blood circulation, and axonal transport, which are required for the functional and structural integrity of a neuron, will be increased after neural mobilization.

Marks reported that NM applied to cervico-brachial pain patients enhanced their lateral flexion and rotation. This result indicates that NM stimulates mechanical receptors, thereby increasing neural gliding and enlarging nerve-track distance and improving neural movements. It also relaxes the nerves where they collide with each other, thus breaking nerve adhesion and moving the nerve roots without pain. NM is regarded as having an impact on retraining the joints and muscles that are adjacent to the nerves. " [15]".

Shacklock's principle of neurodynamics suggests the interconnection among nerve mechanics and physiology. Mechanical factors, including tension, compression, or traction of neural tissue, affect physiological responses in intraneural blood flow, axonal transport, mechanosensitivity, and sympathetic evaluation.

Richard F Ellis studied systemic reviews of randomized controlled trials on therapeutic efficacy of neural mobilization and found that 8 literatures are in favor of effectiveness whereas 3 literatures are stating that there no significant improvement seen in therapeutic effect of neural mobilization. "[16]".

S v scrimshaw has studies randomized controlled trial on efficacy of neural mobilization after spinal surgery and stated that neural mobilization did not provide an additional benefit to standard postoperative care for patients undergoing spinal surgery. The authors advocate that this protocol not be used in clinical practice. "[17]".

The significant decrease in pain "[21]" intensity may be due to the movement of the nerve that helps to control pain at the level of the central nervous system. This technique helps in the oxygenation of nerve, thus decreasing the ischemic pain. In gait control theory, stimulation of mechanoreceptors inside the joint capsule and surrounding tissue prevents pain at the spinal cord level.

However, subjects in the neural tension technique group showed more improvement than neural sliding technique group. Thus neural tension technique has more significant effect on reducing Edema, hypoxia and other associated symptoms. In this way, it shows the improvement in numerical pain rating scale, Neck disability index and patient specific functional scale.

Limitations

- Small sample size.
- Long term follow up was not taken.
- Only acute or sub-acute neck pain patients were included.

Further Recommendation

- The study can be done on other nerves like lower limb nerves.
- The study can be done on other type of conditions.
- The study can be done based on dominant and non-dominant extremities.
- The study can be done on equal number of gender distribution.

5. Conclusion

In context to the results and discussion of the study we do observe highly significant changes in neural tension technique and neural sliding technique on pain and functional disability in cervical radiculopathy. However in this study neural tension technique was found to be more effective than neural sliding technique on pain and functional disability in cervical radiculopathy.

Summary

In this study we compared two techniques of Neurodynamic mobilization (Neural tension technique vs. neural sliding technique) on pain and functional disability in patients with cervical radiculopathy. Total 30 patients were included in

the study. All the subjects were assessed by Assessment form (Demographic Data, Chief Complain, History, General Examination and Inclusion /Exclusion criteria). Numerical pain rating scale (NPRS), Neck Disability index (NDI), and Patient specific functional scale (PSFS) were used as outcome measure. Then divided them into two groups in which one group of patients has been treated with neural tension technique and second group of patients has been treated with Neural sliding technique. As a result we found that patient who has been treated with neural tension technique has been found more improvement in outcome measures than patients who have been treated with Neural sliding technique. Thus in this study we found that Neural Tension Technique is more effective than Neural sliding technique on pain and functional disability in cervical radiculopathy.

Compliance with ethical standards

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Disclosure of conflict of interest

None.

Statement of ethical approval

Ethical approval had been approved by Ethics committee, School of physiotherapy, RK. University (ECR/259/Indt/GJ/2016/RR-21) on 10/01/2022.

Statement of informed consent

Informed consent of the entire patient had been taken which are undergone studies.

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