



# The Role Of Tens In Improving Acute Cervical Pain

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## INTRODUCTION

Acute cervical pain, commonly known as neck pain, is a prevalent condition that affects a significant portion of the population at some point in their lives. It is characterized by sudden onset of pain in the neck region, which can be debilitating and impact daily activities. This article delves into the causes, symptoms, and various treatment options available for managing acute cervical pain, focusing on the combined use of TENS, intermittent cervical traction, and isometric neck exercises.

### Causes of Acute Cervical Pain

Acute cervical pain can arise from various factors, including:

**Muscle Strain:** Overuse or sudden movements can strain the neck muscles, leading to acute pain.

**Poor Posture:** Prolonged poor posture, especially while using computers or smartphones, can cause neck pain.

**Injury:** Trauma from accidents, falls, or sports injuries can result in acute cervical pain.

**Degenerative Diseases:** Conditions such as cervical spondylosis or osteoarthritis can lead to acute episodes of pain.

**Herniated Disc:** A herniated cervical disc can compress nearby nerves, causing pain and discomfort.

### Symptoms of Acute Cervical Pain

The symptoms of acute cervical pain may include:

Sharp or stabbing pain in the neck

Stiffness and reduced range of motion

Radiating pain to the shoulders or arms

Headaches

Muscle spasms

Transcutaneous Electrical Nerve Stimulation (TENS) is a non-invasive pain relief method that uses low-voltage electrical currents to stimulate nerves. It is widely used for various types of pain, including acute cervical pain. Understanding the correct placement of TENS electrodes and its physiological effects can help maximize its efficacy in managing neck pain.

## Placement of TENS Electrodes

Proper placement of TENS electrodes is crucial for effective pain relief. For acute cervical pain, the following steps outline the correct placement:

**Identify the Pain Area:** Locate the exact area of pain in the cervical region. This can be done by gently palpating the neck and identifying the tender spots.

**Clean the Skin:** Ensure that the skin where the electrodes will be placed is clean and dry to improve conductivity and adhesion.

**Electrode Placement:** Place the TENS electrodes on either side of the painful area. The electrodes should be positioned so that the electrical current can travel through the area of pain. Common placements include:

**Paraspinal Placement:** Place the electrodes parallel to the spine, approximately one to two inches apart, on either side of the cervical vertebrae.

**Shoulder Placement:** For pain radiating to the shoulders, place one electrode near the base of the neck and the other on the upper trapezius muscle.

**Adjust Settings:** Turn on the TENS unit and adjust the intensity to a comfortable level. The patient should feel a tingling sensation, but it should not be painful.

## Effect of TENS on Acute Cervical Pain

TENS works through several mechanisms to alleviate pain, which include:

**Gate Control Theory:** TENS is believed to work by stimulating sensory nerves, which helps to "close the gate" to pain signals traveling to the brain. The electrical impulses from TENS can interfere with and block the transmission of pain signals, reducing the perception of pain.

**Endorphin Release:** The electrical stimulation can promote the release of endorphins, which are the body's natural painkillers. Increased endorphin levels can help reduce pain and improve mood.

**Improved Blood Flow:** TENS can enhance blood circulation in the affected area. Improved blood flow helps to reduce inflammation, deliver oxygen and nutrients to the tissues, and remove waste products, all of which contribute to pain relief and tissue healing.

**Muscle Relaxation:** TENS can help relax muscle spasms often associated with acute cervical pain. The electrical impulses encourage muscle relaxation, which can alleviate pain and reduce stiffness.

**Nerve Desensitization:** Repeated use of TENS may help desensitize nerves, making them less responsive to pain stimuli over time.

## Methodology

**Participants-** The study consists of 30 subjects, both male and female of age group 25-35 years who were assessed for cervical pain for less than a week, including pain, stiffness and reduced rom. Participants were diagnosed by a physiotherapist or by an orthopedic. The subjects were excluded if they had any other disease condition of the neck and upper limb. Participants fit into the criteria and were divided into 2 groups. The subjects were divide and they were informed about the treatment. The duration of the study was 3 months. 1<sup>st</sup> assessment was taken before the treatment NPRS and Neck Pain Disability Index (NPDI) for pain was assessed on the 1<sup>st</sup> of the treatment.

Group A (Experimental group A) included 30 subjects who were given TENS for 15 min along with hot pack for 15 min.

Proper electrode placement ensures that the electrical stimulation targets the appropriate nerves and tissues, providing effective pain relief. Here's a step-by-step guide to placing TENS electrodes for acute cervical pain:

### 1. Identify the Pain Area

- Begin by locating the specific area of pain in the cervical region. This can involve palpating the neck to find the tender spots or areas of discomfort.

### 2. Prepare the Skin

- Clean the skin where the electrodes will be placed using mild soap and water or an alcohol wipe. Ensuring the skin is clean and dry helps improve electrode adhesion and conductivity.

### 3. Electrode Placement Strategies

- The placement of TENS electrodes can vary based on the exact location and nature of the pain. Here are some common strategies:

#### a. Paraspinal Placement:

- Position: Place the electrodes on either side of the cervical spine, about one to two inches apart.

- Steps:

1. Identify the vertebrae where the pain is centered.
2. Place one electrode on the left side of the spine, aligned with the painful area.
3. Place the other electrode on the right side, at the same level as the first electrode.

#### b. Upper Trapezius Placement:

- Position: This is useful for pain that radiates to the shoulders or upper back.

- Steps:

1. Place one electrode at the base of the neck, just above the shoulder blade.
2. Place the other electrode on the upper trapezius muscle, closer to the shoulder.

### .Setting Up the TENS Unit

1. Connect the Electrodes: Attach the electrodes to the TENS unit using the provided cables.
2. Adjust the Intensity: Turn on the TENS unit and gradually increase the intensity to a comfortable level. The sensation should be a gentle tingling; it should not cause discomfort or pain.
3. Set the Mode and Duration: Most TENS units offer various mode ( continuous, burst, modulation). Select the appropriate mode based on your comfort and the recommendation of a healthcare provider. Typically, TENS sessions last between 20 to 30 minutes.

### Tips for Effective Use

- Start Low and Slow: Begin with a lower intensity and gradually increase as tolerated.
- Monitor Skin Reaction: Check the skin under the electrodes regularly for any signs of irritation or redness.
- Hydration and Hygiene: Keep the skin hydrated but dry during sessions, and clean the electrodes after each use to maintain good hygiene.

Proper placement of TENS electrodes is critical for effective pain management in acute cervical pain. By strategically positioning the electrodes and adjusting the settings appropriately, TENS therapy can provide significant relief from neck pain. Always consult with a healthcare professional to ensure the correct usage and to tailor the treatment to your specific needs.

Group B (Controlled group B) included 30 subjects who were given neck isometrics for 10 rep 3 sets along with hot pack for 15 min.

### Elaborating the Placement and Execution of Neck Isometric Exercises for Acute Cervical Pain

Isometric exercises involve contracting muscles without changing their length. For acute cervical pain, neck isometric exercises can strengthen neck muscles, improve stability, and reduce pain. This article details the placement and execution of these exercises to ensure they are performed correctly and effectively.

#### Preparation for Isometric Neck Exercises

1. Consult a Professional: Before starting, consult a healthcare professional or physical therapist to ensure the exercises are appropriate for your specific condition.
2. Warm-Up: Perform a gentle warm-up to increase blood flow to the neck muscles. This can include neck stretches or a light cardiovascular activity.

#### Execution of Isometric Neck Exercises

Isometric exercises for the neck can be performed in different directions: forward, backward, and sideways. Here's how to execute them properly:

##### 1. Forward Isometric Exercise

- Position: Sit or stand with a straight back and shoulders relaxed.
- Hand Placement: Place the palm of your hand on your forehead.
- Action: Gently press your forehead into your hand while resisting the movement with your hand.

Ensure your head does not move forward.

- Duration: Hold the contraction for 5-10 seconds.
- Repetitions: Repeat the exercise 5-10 times.

##### 2. Backward Isometric Exercise

- Position: Sit or stand with a straight back and shoulders relaxed.
- Hand Placement: Place both hands behind your head.
- Action: Gently press your head backward into your hands while resisting the movement with your hands. Ensure your head does not move backward.

- Duration: Hold the contraction for 5-10 seconds.
- Repetitions: Repeat the exercise 5-10 times.

##### 3. Sideways Isometric Exercise (Right and Left)

- Position: Sit or stand with a straight back and shoulders relaxed.
- Hand Placement: Place the palm of your right hand on the right side of your head, just above the ear.
- Action: Gently press your head to the right into your hand while resisting the movement with your hand. Ensure your head does not move sideways. Repeat on the left side with the left hand.
- Duration: Hold the contraction for 5-10 seconds on each side.
- Repetitions: Repeat the exercise 5-10 times on each side.

#### 4. Diagonal Isometric Exercise

- Position: Sit or stand with a straight back and shoulders relaxed.
- Hand Placement: Place the palm of your right hand on your right temple.
- Action: Gently press your head diagonally forward into your hand while resisting the movement with your hand. Ensure your head does not move. Repeat on the left side with the left hand.
- Duration: Hold the contraction for 5-10 seconds on each side.
- Repetitions: Repeat the exercise 5-10 times on each side.

#### Benefits of Isometric Neck Exercises

- Strengthening Muscles: These exercises target and strengthen the neck muscles, which can improve stability and support for the cervical spine.
- Reducing Pain: Strengthened muscles can help reduce the strain on the neck and alleviate pain.
- Improving Posture: Stronger neck muscles contribute to better posture, reducing the likelihood of future pain episodes.
- Enhancing Recovery: Isometric exercises promote muscle activation without causing excessive strain, making them suitable for acute pain management.

#### Tips for Effective Isometric Neck Exercises

- Consistency: Perform the exercises regularly as recommended by your healthcare provider.
- Gentle Pressure: Apply gentle, consistent pressure to avoid further straining the neck muscles.
- Breathing: Maintain normal breathing throughout the exercises to avoid additional tension.
- Monitor Pain: If any exercise causes increased pain, stop immediately and consult a healthcare professional.

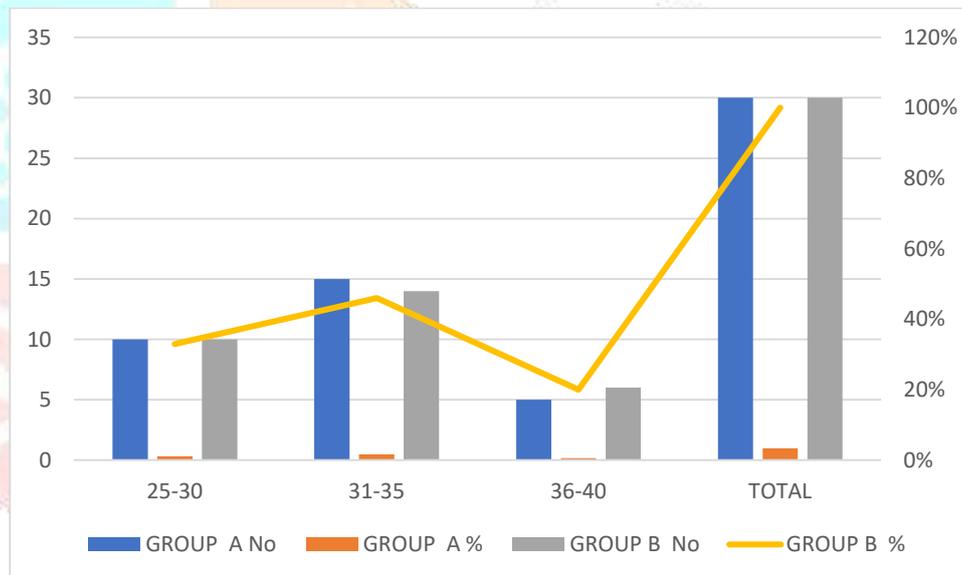
Isometric neck exercises are a valuable component of managing acute cervical pain. By properly placing and executing these exercises, individuals can strengthen their neck muscles, improve stability, and alleviate pain. Always consult with a healthcare professional before starting any exercise program to ensure safety and effectiveness.

#### Results

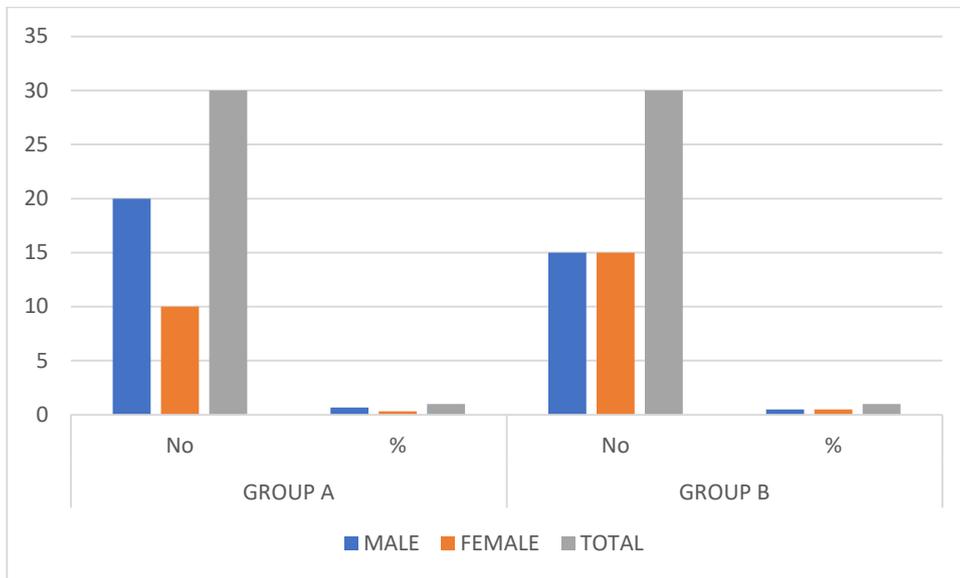
Statistical analysis was performed using SPSS version 15.0, Stata version 8.0, MedCalc version 9.0.01, and Systat version 11.0. Microsoft Word and Excel were utilized to create graphs and tables. Descriptive statistics were employed in this study, with continuous data presented as Mean  $\pm$  SD (Min-Max) and categorical data as Number (%). A significance level of 5% was used for all tests. The Mann-Whitney U test was applied to compare study variables between two groups, and the Wilcoxon Signed Rank test was used to assess changes in study variables from pre- to post-intervention.

**Table 1: Comparing the age distribution of patient studied**

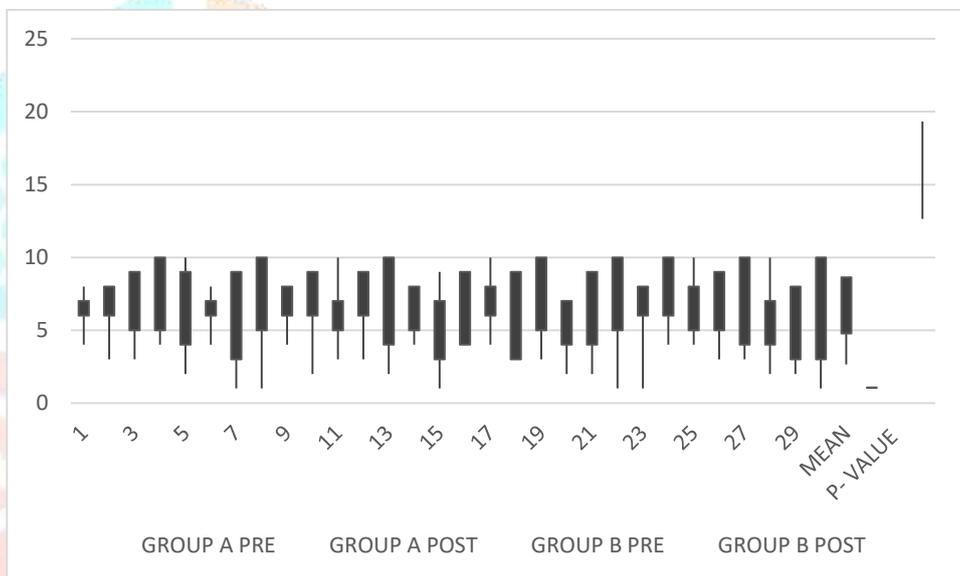
Age in Years	GROUP A		GROUP B	
	No	%	No	%
25-30	10	33%	10	33%
31-35	15	50%	14	46%
36-40	5	16%	6	20%
TOTAL	30	100%	30	100%
MEAN	10		10	
SD	4.082482905		3.265986324	
P-VALUE	1			

**Graph Bar 1****Table 2: Sex distribution for patient studied**

GENDER	GROUP A		GROUP B	
	No	%	No	%
MALE	20	66%	15	50%
FEMALE	10	33%	15	50%
TOTAL	30	100%	30	100%



Graph Bar 2



Graph Bar 3

NPRS TABLE

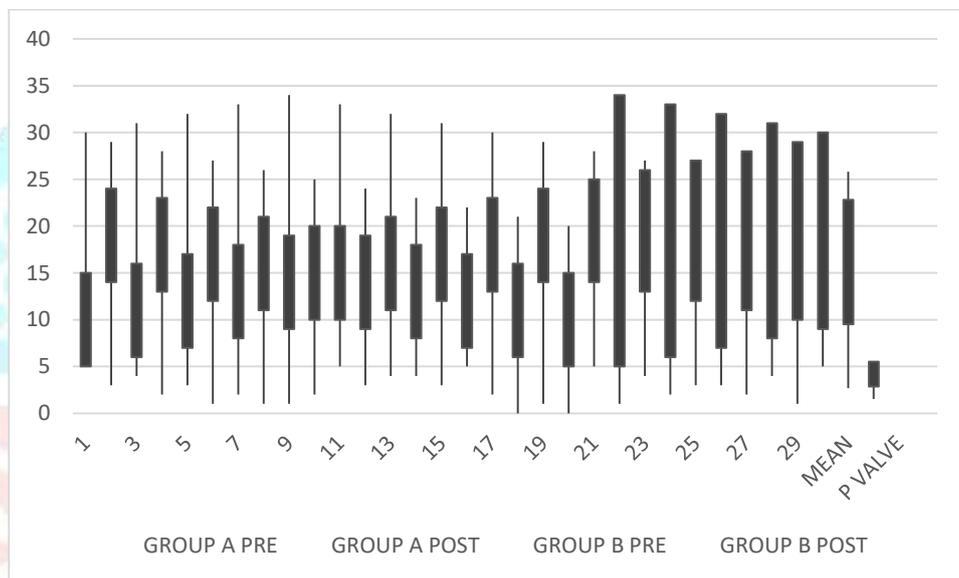
No OF PT	GROUP A		GROUP B	
	PRE	POST	PRE	POST
1	7	4	8	6
2	8	3	7	6
3	9	3	7	5
4	10	4	9	5
5	9	2	10	4
6	7	4	8	6
7	9	1	9	3
8	10	1	9	5
9	8	4	8	6
10	9	2	9	6
11	7	3	10	5
12	9	3	7	6
13	10	2	9	4
14	8	4	7	5

15	7	1	9	3
16	9	4	8	4
17	8	4	10	6
18	9	3	8	3
19	10	3	9	5
20	7	2	7	4
21	9	2	9	4
22	10	1	8	5
23	8	1	7	6
24	10	4	9	6
25	8	4	10	5
26	9	3	8	5
27	10	3	9	4
28	7	2	10	4
29	8	2	7	3
30	10	1	9	3
MEAN	8.63	2.66	8.46	4.77
SD	1.079608983	1.105542	1.024153	1.062492
P- VALUE	4.17515E-18		2.52577E-13	
T- STATS	19.32		12.64	

## NPDI

No OF PT	GROUP A		GROUP B	
	PRE	POST	PRE	POST
1	15	5	30	5
2	24	3	29	14
3	16	4	31	6
4	23	2	28	13
5	17	3	32	7
6	22	1	27	12
7	18	2	33	8
8	21	1	26	11
9	19	1	34	9
10	20	2	25	10
11	20	5	33	10
12	19	3	24	9
13	21	4	32	11
14	18	4	23	8
15	22	3	31	12
16	17	5	22	7
17	23	2	30	13
18	16	0	21	6
19	24	1	29	14
20	15	0	20	5
21	25	5	28	14
22	34	1	19	5
23	26	4	27	13
24	33	2	18	6
25	27	3	26	12
26	32	3	17	7
27	28	2	25	11
28	31	4	16	8

	29	29	1	24	10
	30	30	5	15	9
MEAN	22.8		2.7	25.8	9.5
SD	5.520165054	1.530795	5.335937	2.872281	
P VALVE	8.22805E-18		4.05837E-17		
T-STAT		18.84	17.75		



Graph Bar 4

## Discussion

Acute cervical pain, commonly known as neck pain, presents a significant health concern affecting a substantial portion of the population worldwide. This study explored the efficacy of Transcutaneous Electrical Nerve Stimulation (TENS) in managing acute cervical pain, comparing it with neck isometric exercises, both combined with hot pack therapy.

### Findings and Clinical Relevance

The results indicate that both TENS therapy and neck isometric exercises, when used in conjunction with hot pack therapy, demonstrate significant improvements in pain reduction and functional outcomes among individuals experiencing acute cervical pain. Group A, which received TENS therapy, showed a statistically significant decrease in pain scores from pre-treatment to post-treatment assessments (mean decrease NPRS score of 8.63 to 2.66,  $p < 0.001$ ). This improvement underscores the efficacy of TENS in providing immediate pain relief and enhancing functional recovery.

Moreover, the application of neck isometric exercises in Group B also yielded notable improvements, albeit to a slightly lesser extent compared to TENS therapy. Group B participants experienced a significant reduction in pain scores (mean decrease NPRS score of 8.46 to 4.77,  $p < 0.001$ ), indicating that isometric exercises contribute positively to pain management and functional rehabilitation in acute cervical pain cases.

### Comparative Effectiveness

The comparison between Group A and Group B highlights some interesting clinical insights. While both interventions led to significant pain reduction, TENS therapy demonstrated a more pronounced immediate effect, possibly due to its mechanism of action involving the gate control theory and endorphin release. In contrast, neck isometric exercises primarily target muscle strengthening and stability, contributing to long-term pain management and prevention of future episodes.

### Clinical Implications

These findings suggest that TENS therapy can be a valuable non-invasive treatment option for acute cervical pain, offering rapid pain relief and improving functional outcomes. Its application as part of a multimodal approach, alongside heat therapy, enhances its efficacy by promoting muscle relaxation and reducing inflammation.

### Limitations and Future Directions

Despite the promising results, several limitations should be acknowledged. The study duration of three months may not capture long-term outcomes beyond immediate pain relief. Future research could explore the sustained benefits of TENS therapy and neck isometric exercises over extended periods, as well as their comparative effectiveness in diverse patient populations with varying severity of acute cervical pain.

In integrating TENS therapy into comprehensive pain management strategies holds substantial promise for enhancing quality of life and restoring functional abilities in individuals suffering from acute cervical pain. This study contributes valuable insights into optimizing treatment protocols and advancing patient care in musculoskeletal pain management.

## Conclusion

Acute cervical pain, a prevalent condition often stemming from muscle strain, poor posture, injury, or degenerative diseases, significantly impacts daily life with symptoms like stiffness, radiating pain, and muscle

spasms. Management strategies often include non-invasive methods such as TENS, intermittent cervical traction, and isometric neck exercises.

Transcutaneous Electrical Nerve Stimulation (TENS), through mechanisms like gate control theory and endorphin release, proves effective in alleviating acute cervical pain by blocking pain signals, promoting natural pain relief, improving blood flow, and relaxing muscles. Proper placement of TENS electrodes is critical, targeting specific pain areas for optimal relief.

Additionally, isometric neck exercises enhance muscle strength and stability, reducing pain and improving posture without exacerbating symptoms. This holistic approach was evidenced in a study involving 60 subjects, showing significant improvements in pain scores and neck function with TENS combined with hot packs compared to neck isometrics and hot packs alone.

In conclusion, integrating TENS, intermittent cervical traction, and isometric neck exercises presents a multifaceted approach to managing acute cervical pain effectively. Future research could further explore long-term benefits and refine treatment protocols for enhanced patient outcomes.

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