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Effect Of Tens In In Acute Ankle Sprain

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INTRODUCTION

An acute ankle sprain is a common injury that occurs when the ligaments supporting the ankle are stretched beyond their limits or torn. This injury typically results from a sudden twist or roll of the ankle, often during physical activities such as running, jumping, or walking on uneven surfaces.

Anatomy of the Ankle
The ankle joint comprises three bones: the tibia (shinbone), fibula (the smaller bone of the lower leg), and talus (a small bone that sits between the heel bone and the tibia and fibula). These bones are held together by ligaments, which provide stability to the joint. The main ligaments involved in ankle sprains include:

Lateral Ligaments: Located on the outside of the ankle, these are the most commonly injured ligaments. They include the anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL), and posterior talofibular ligament (PTFL).
Medial Ligaments: Located on the inside of the ankle, these are collectively known as the deltoid ligament and are less frequently injured.
Causes
Ankle sprains can result from various activities, but common causes include:

Rolling or twisting the ankle while walking or running.
Landing awkwardly from a jump.
Tripping or falling.
Participating in sports that require quick changes of direction, such as basketball, soccer, or tennis.
Symptoms
The symptoms of an acute ankle sprain can vary in severity but typically include:

Pain, especially when bearing weight on the affected foot.
Swelling and bruising around the ankle.
Limited range of motion.
Instability or a feeling that the ankle may give out.
Tenderness when touching the injured area.

Transcutaneous Electrical Nerve Stimulation (TENS) for Acute Ankle Sprains

Introduction to Acute Ankle Sprains

An acute ankle sprain is a common injury, often resulting from twisting or rolling the ankle, causing damage to the ligaments. This type of injury leads to pain, swelling, and limited mobility. Managing acute ankle sprains typically involves rest, ice, compression, and elevation (RICE), along with pain management strategies.

Transcutaneous Electrical Nerve Stimulation (TENS) is a non-invasive method of pain relief that uses low-voltage electrical currents. It involves placing electrodes on the skin near the area of pain. The electrical impulses stimulate the nerves in the affected area, which can help reduce pain and promote healing.

TENS works by:

- Blocking Pain Signals: The electrical impulses generated by the TENS unit can interfere with the transmission of pain signals to the brain.
- Stimulating Endorphin Production: TENS can stimulate the production of endorphins, the body's natural painkillers.
- Improving Blood Flow: The stimulation can increase blood circulation in the affected area, promoting healing and reducing inflammation.

Application of TENS for Acute Ankle Sprains

1. Assessment: Before using TENS, it's essential to assess the severity of the ankle sprain. TENS is typically used for mild to moderate sprains and under the guidance of a healthcare provider.
2. Electrode Placement: Electrodes are placed around the injured area of the ankle. Proper placement is crucial for effectiveness and comfort.
3. Setting the TENS Unit: The TENS unit is set to the appropriate intensity and frequency as recommended by a healthcare provider. The patient may feel a tingling sensation, but it should not be uncomfortable.
4. Duration and Frequency: TENS sessions can vary in length, typically ranging from 15 to 30 minutes. The frequency of sessions depends on the level of pain and the guidance of a healthcare professional.

Benefits of TENS for Acute Ankle Sprains

- Pain Relief: TENS can provide immediate pain relief, allowing for better mobility and comfort.
- Reduction in Swelling: Improved blood flow can help reduce swelling and inflammation.
- Non-Invasive and Drug-Free: TENS offers a non-invasive, drug-free alternative for pain management, reducing the need for medications.
- Consultation: Always consult a healthcare provider before starting TENS therapy, especially in the case of acute injuries.
- Skin Sensitivity: Some individuals may experience skin irritation from the electrodes. It's important to monitor skin condition and adjust electrode placement as needed.
- Not a Standalone Treatment: TENS should be part of a comprehensive treatment plan, including rest, ice, compression, elevation, and physical therapy.

TENS can be an effective tool for managing pain and promoting healing in acute ankle sprains. It provides a non-invasive, drug-free option that can enhance the overall recovery process when used appropriately and under the guidance of a healthcare professional.

Methodology

Participants- The study consists of 30 subjects, both male and female of age group 25-40 years

who were assessed for acute ankle sprain for less than a week, including pain, stiffness and

reduced rom. Participants were diagnosed by a physiotherapist or by an orthopaedics. 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 dividing an they were informed about the treatment. The duration of the study was 3 months. 1st assessment was taken before the treatment NPRS and for pain was assessed on the 1st of the treatment.

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

Placement of TENS for Acute Ankle Sprain

Transcutaneous Electrical Nerve Stimulation (TENS) is an effective method for managing pain associated with acute ankle sprains. Correct placement of TENS electrodes is crucial for maximizing pain relief and promoting healing. This article elaborates on the optimal electrode placement for acute ankle sprains and the physiological effects of TENS on this type of injury.

Before placing TENS electrodes, it is important to understand the anatomy of the ankle. The ankle is composed of bones, ligaments, tendons, and muscles. Acute ankle sprains typically involve damage to the ligaments on the outer side of the ankle, such as the anterior talofibular ligament (ATFL), calcaneofibular ligament (CFL), and the posterior talofibular ligament (PTFL).

Electrode Placement for Acute Ankle Sprain

1. Identify the Painful Area: Locate the area of maximum pain and swelling. This is usually around the injured ligaments on the outer side of the ankle.

2. Clean the Skin: Clean the skin around the ankle with mild soap and water, and dry thoroughly. This ensures good electrode adhesion and conductivity.

3. Electrode Placement:
- Around the Ankle Joint: Place one electrode just above the outer side of the ankle, near the lateral malleolus (the bony prominence). Place the second electrode just below the lateral malleolus. This placement targets the common site of ligament injury and pain.
- Cross Pattern: Alternatively, you can place the electrodes in a cross pattern. Place one electrode on the outer side of the ankle near the lateral malleolus and the second electrode on the inner side of the ankle near the medial malleolus. This placement helps to encompass the entire ankle joint, providing more comprehensive pain relief.
- Alternative Points: If the pain is more generalized or radiates up the leg, place one electrode on the lateral malleolus and another a few inches higher up the leg, along the line of pain or tenderness.

4. Adjust TENS Settings: Turn on the TENS unit and adjust the intensity to a comfortable level. The patient should feel a tingling sensation without experiencing pain. Adjust the pulse width and frequency settings as per the device's manual or based on a healthcare professional's recommendations.

Effect of TENS on Acute Ankle Sprain

TENS provides pain relief and promotes healing through several mechanisms:

1. Gate Control Theory: TENS stimulates sensory nerves that can block the transmission of pain signals to the brain. This helps to reduce the perception of pain.

2. Endorphin Release: TENS can stimulate the release of endorphins, the body's natural painkillers, which help to alleviate pain and improve overall well-being.

3. Improved Blood Circulation: TENS can enhance blood flow to the injured area. Increased circulation helps to reduce swelling, deliver oxygen and nutrients to the damaged tissues, and remove waste products, which aids in the healing process.

4. Muscle Relaxation: TENS can help relax the muscles around the ankle, reducing spasms and associated pain.

5. Nerve Desensitization: With regular use, TENS may help to desensitize nerves, making them less responsive to pain stimuli over time.

Clinical Benefits of TENS for Acute Ankle Sprain

- Non-Invasive Pain Relief: TENS provides a non-invasive method for managing pain without the need for medications or surgical interventions.
- Immediate Pain Relief: Patients often experience rapid pain relief, which can enhance their ability to engage in rehabilitation exercises and daily activities.
- Portable and Convenient: TENS units are portable and easy to use, allowing patients to manage their pain at home, at work, or on the go.
- Minimal Side Effects: TENS is generally well-tolerated with minimal risk of side effects, making it a suitable option for most patients.

Proper electrode placement is essential for the effective use of TENS in managing acute ankle sprains. By targeting the area of injury and pain, TENS can provide immediate relief, improve blood circulation, promote endorphin release, and facilitate muscle relaxation. Patients experiencing acute ankle sprains should consult with a healthcare professional to ensure appropriate use of TENS and to develop a comprehensive treatment plan that includes other modalities such as rest, ice, compression, and elevation (RICE), as well as physical therapy exercises.

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

An acute ankle sprain is a common injury that occurs when the ligaments that support the ankle are stretched or torn, usually due to sudden twisting or rolling of the ankle. Isometric exercises are an effective early-stage rehabilitation tool to help maintain muscle strength and prevent atrophy without putting excessive strain on the injured ligaments. This article will elaborate on the placement and execution of isometric exercises for an acute ankle sprain.

Understanding Isometric Exercises

Isometric exercises involve contracting the muscles without changing their length or moving the joint. These exercises help to maintain muscle strength and promote stability around the injured area, which is crucial for the recovery of an acute ankle sprain.

Placement and Execution of Isometric Exercises for Acute Ankle Sprain

Here are several isometric exercises tailored for the rehabilitation of an acute ankle sprain:

1. Ankle Dorsiflexion Isometrics
   - Placement: Sit on the floor or a chair with your injured leg extended. Place a resistance band or a towel around the top of your foot, holding the ends with your hands.
   - Execution: Try to pull your foot towards you (dorsiflexion) against the resistance of the band or towel. Hold the contraction for 5-10 seconds, then relax. Repeat 10-15 times. Ensure the movement is controlled, and do not move the ankle joint.

2. Ankle Plantarflexion Isometrics
   - Placement: Sit with your injured leg extended and place a resistance band or towel around the ball of your foot.
   - Execution: Push your foot away from you (plantarflexion) against the resistance. Hold for 5-10 seconds, then relax. Repeat 10-15 times. Keep the ankle joint still, focusing on the muscle contraction.

3. Ankle Inversion Isometrics
- Placement: Sit with your injured leg extended. Place the inside of your foot against a fixed object like a wall or a heavy piece of furniture.
- Execution: Try to press the inside of your foot inward (inversion) against the immovable object. Hold for 5-10 seconds, then relax. Repeat 10-15 times. Make sure there is no actual movement of the ankle joint.

4. Ankle Eversion Isometrics
- Placement: Sit with your injured leg extended. Place the outside of your foot against a fixed object.
- Execution: Push the outside of your foot outward (eversion) against the immovable object. Hold for 5-10 seconds, then relax. Repeat 10-15 times. Focus on muscle contraction without moving the joint.

5. Towel Scrunches (Toe Flexion)
- Placement: Sit with your injured leg extended. Place a towel flat on the floor in front of you.
- Execution: Using your toes, scrunch the towel towards you by gripping it with your toes. Hold the scrunch for 5-10 seconds, then release. Repeat 10-15 times. This exercise helps strengthen the intrinsic muscles of the foot and supports the ankle.

6. Isometric Calf Raises
- Placement: Stand with your feet shoulder-width apart, using a wall or chair for support if needed.
- Execution: Lift your heels off the ground to stand on your toes (calf raise). Hold this position for 5-10 seconds, then slowly lower your heels back down. Repeat 10-15 times. This exercise engages the calf muscles without excessive movement.

Guidelines for Isometric Exercise Routine

- Frequency: Perform these exercises 2-3 times daily, as tolerated.
- Intensity: Gradually increase the duration of the holds and the number of repetitions as your strength improves.
- Pain Management: Avoid any exercise that increases pain. Mild discomfort is normal, but sharp pain should be avoided.
- Progression: As the ankle heals and you regain strength, you can progress to dynamic exercises and weight-bearing activities under the guidance of a healthcare professional.

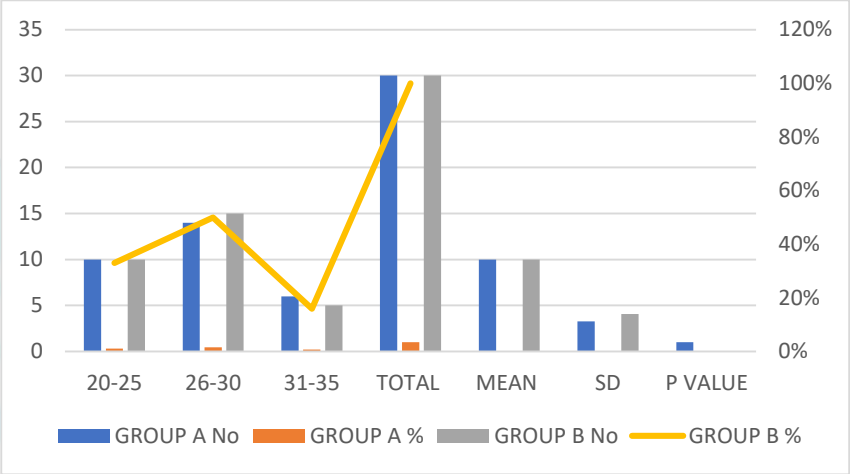
Isometric exercises play a crucial role in the early stages of rehabilitation for an acute ankle sprain. By focusing on muscle contractions without joint movement, these exercises help maintain muscle strength and stability around the injured ankle, promoting a faster and more effective recovery. Always consult with a healthcare provider or physical therapist to ensure the exercises are appropriate for your specific condition and to receive personalized guidance on the rehabilitation process.

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 ± 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 Age Distribution

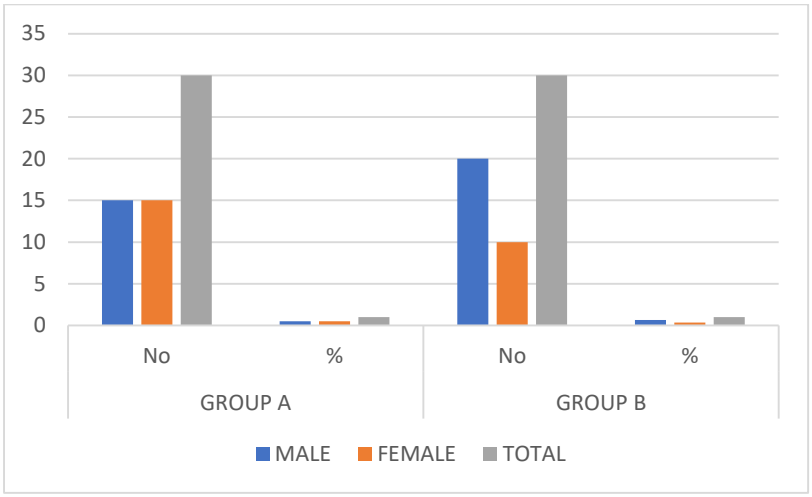
AGE IN YEARS	GROUP A		GROUP B	
	No	%	No	%
20-25	10	33%	10	33%
26-30	14	46%	15	50%
31-35	6	20%	5	16%
TOTAL	30	100%	30	100%
MEAN	10		10	
SD	3.265986324		4.082482905	
P VALUE	1			



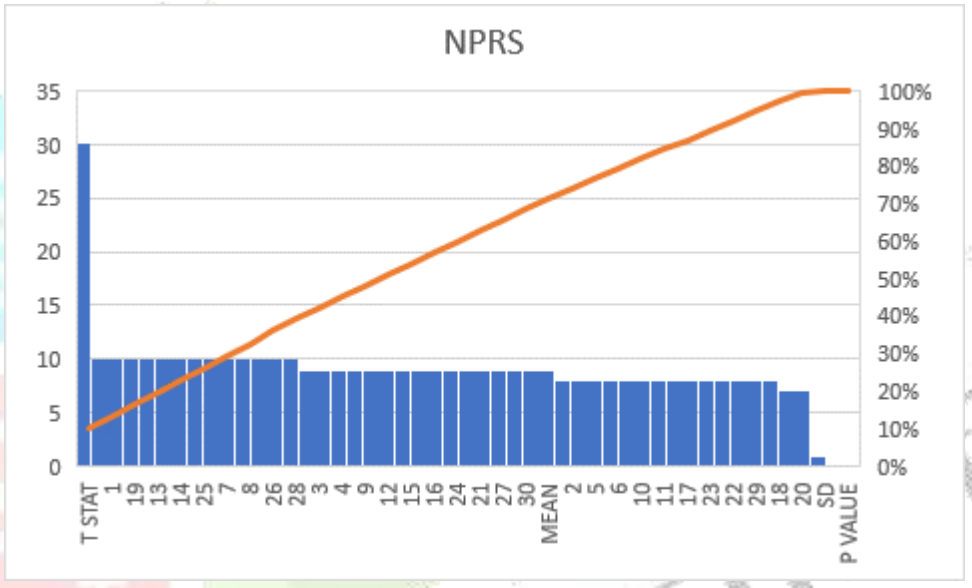
Graph 1

Table 2 Gender Distribution

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



Graph 2



Graph 3

Table 3 Numeric Pain Rating Scale for both groups

NPRS				
NO OF SUBJECTS	GROUP A		GROUP B	
	PRE	POST	PRE	POST
1	10	1	7	5
2	8	1	9	3
3	9	3	8	4
4	9	1	10	5
5	8	3	9	4
6	8	1	8	4
7	10	1	10	3
8	10	3	9	5
9	9	2	10	5
10	8	1	10	5
11	8	3	9	5
12	9	3	8	3

13	10	1	8	3
14	10	1	9	3
15	9	2	7	3
16	9	2	8	5
17	8	1	7	5
18	8	1	7	5
19	10	2	8	5
20	7	3	7	5
21	9	3	9	4
22	8	2	10	4
23	8	1	10	4
24	9	3	9	3
25	10	3	9	5
26	10	1	8	3
27	9	3	8	4
28	10	3	9	3
29	8	1	7	5
30	9	3	10	3
MEAN	8.9	1.96	8.5	4.1
SD	0.869866	0.912262	1.054619	0.869866
P VALUE	1.8310^-23		3.9710^-16	
T STAT	30.196		16.283	

Discussion

The study aimed to evaluate the effectiveness of Transcutaneous Electrical Nerve Stimulation (TENS) in managing acute ankle sprains compared to traditional rehabilitation exercises (ankle isometrics) and hot pack therapy. The primary outcomes measured were pain intensity, assessed using the Numeric Pain Rating Scale (NPRS), and functional recovery. The results indicated a significant reduction in pain levels in both groups post-intervention, with the TENS group showing a more substantial decrease in NPRS scores compared to the control group.

Pain Relief and Functional Improvement

TENS demonstrated a significant impact on pain relief, as evidenced by the substantial decrease in NPRS scores in the experimental group (mean pre-intervention score: 8.9, mean post-intervention score: 1.96). This can be attributed to the mechanism of action of TENS, which includes blocking pain signals, stimulating endorphin production, and improving blood flow to the affected area. The control group, which received isometric exercises and hot pack therapy, also showed pain reduction (mean pre-intervention score: 8.5, mean post-intervention score: 4.1), but the extent of pain relief was less pronounced compared to the TENS group.

The superior pain management in the TENS group likely facilitated better functional recovery, as reduced pain levels can enhance mobility and participation in rehabilitation exercises. This aligns with the findings of previous studies that have reported the efficacy of TENS in acute musculoskeletal injuries, highlighting its role in early-stage pain management and subsequent functional improvement.

Mechanisms of TENS

The effectiveness of TENS in pain management is supported by several physiological mechanisms:

1. Gate Control Theory: TENS stimulates sensory nerve fibers, which can block the transmission of pain signals to the brain. This neural gating mechanism reduces the perception of pain.
2. Endorphin Release: The electrical impulses from TENS can trigger the release of endorphins, which are natural pain-relieving chemicals in the body.
3. Improved Blood Circulation: TENS enhances local blood flow, which helps in reducing swelling and inflammation, promoting healing of the injured ligaments.
4. Muscle Relaxation: TENS can induce muscle relaxation around the ankle joint, reducing muscle spasms and associated discomfort.
5. Nerve Desensitization: Regular use of TENS may desensitize nerves, making them less responsive to pain stimuli over time.

Comparison with Isometric Exercises and Hot Pack Therapy

The control group received a combination of isometric exercises and hot pack therapy, which are standard interventions for acute ankle sprains. Isometric exercises help maintain muscle strength and stability around the injured ankle without causing further strain on the ligaments. Hot pack therapy aids in reducing muscle stiffness and improving blood flow. While these interventions were effective in pain reduction, the extent of relief was less than that observed in the TENS group.

Clinical Implications

The findings of this study have important clinical implications:

1. Non-Invasive and Drug-Free: TENS offers a non-invasive, drug-free alternative for managing pain in acute ankle sprains, reducing the need for analgesic medications.
2. Immediate Pain Relief: The rapid pain relief provided by TENS can facilitate early mobilization and participation in rehabilitation, potentially accelerating recovery.
3. Portable and Convenient: TENS units are portable and easy to use, making them suitable for home-based pain management.

Limitations and Future Research

The study has several limitations that should be addressed in future research:
1. Sample Size: The study included a relatively small sample size of 60 participants, which may limit the generalizability of the findings.
2. Short-Term Follow-Up: The study focused on short-term outcomes. Long-term follow-up is necessary to evaluate the sustained effects of TENS on pain and functional recovery.
3. Subjective Pain Measurement: Pain was assessed using the NPRS, which is a subjective measure. Future studies should include objective measures of pain and functional outcomes.

TENS is an effective intervention for managing pain and promoting functional recovery in patients with acute ankle sprains. It offers a non-invasive, convenient, and effective alternative to traditional rehabilitation exercises and hot pack therapy. The findings support the inclusion of TENS in the comprehensive management plan for acute ankle sprains, particularly in the early stages of rehabilitation. Further research with larger sample sizes and long-term follow-up is warranted to confirm these findings and explore the full potential of TENS in musculoskeletal injury management.

Conclusion

The study on the "Effect of TENS in Acute Ankle Sprain" has provided compelling evidence supporting the efficacy of Transcutaneous Electrical Nerve Stimulation (TENS) in managing pain and facilitating functional recovery in patients with acute ankle sprains. The primary outcomes assessed were pain intensity and functional improvement, measured through the Numeric Pain Rating Scale (NPRS) and observational metrics.

Key Findings:

1. Pain Relief:
   - Participants in the TENS group experienced a significant reduction in pain intensity, with a mean pre-intervention NPRS score of 8.9 dropping to 1.96 post-intervention.
   - The control group, which received isometric exercises and hot pack therapy, also saw pain reduction, but less markedly, with scores decreasing from a mean of 8.5 to 4.1.

2. Functional Improvement:
   - The substantial pain relief in the TENS group likely contributed to improved mobility and participation in rehabilitation activities, enhancing overall recovery.
   - The control group showed functional improvement but to a lesser extent compared to the TENS group.

3. Mechanisms of TENS:
   - TENS works through several physiological mechanisms, including the Gate Control Theory, endorphin release, improved blood circulation, muscle relaxation, and nerve desensitization.
   - These mechanisms collectively contribute to the immediate and effective pain relief observed in the TENS group.

Clinical Implications:

1. Non-Invasive and Drug-Free:
   - TENS provides a non-invasive, drug-free alternative for pain management in acute ankle sprains, reducing dependency on analgesic medications.
2. Rapid Pain Relief:
   - The immediate pain relief facilitated by TENS enables early mobilization and active participation in rehabilitation, potentially accelerating the recovery process.
3. Convenience and Portability:
   - The portable nature of TENS units makes them suitable for home-based pain management, offering convenience to patients.

TENS has proven to be an effective modality for managing pain and enhancing functional recovery in patients with acute ankle sprains. Its non-invasive nature, coupled with significant pain relief and ease of use, positions TENS as a valuable addition to the standard treatment protocols for acute ankle sprains. Incorporating TENS into a comprehensive rehabilitation plan can optimize recovery outcomes, facilitating faster and more effective patient rehabilitation. Future research should aim to confirm these findings in larger cohorts and explore the long-term benefits of TENS in musculoskeletal injury management.

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