Effectiveness of Transcutaneous Electrical Nerve Stimulation On Pain, And Functional Outcome in Patients Suffering from Type I Complex Regional Pain Syndrome in Upper Extremity

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Introduction and Methods

- **Background**-Severe pain, edema, temperature and color changes in the affected areas of the skin, motor and sensory impairments, and trophic alterations are the hallmarks of complex regional pain syndrome (CRPS). Research has indicated that transcutaneous electrical nerve stimulation (TENS) therapy is efficacious in managing acute musculoskeletal pain, controlling pain following surgery, and treating musculoskeletal illnesses such persistent low back and neck discomfort. Nevertheless, there is not enough proof to support TENS efficacy in treating CRPS Type I.
- **Objective**- To investigate whether transcutaneous electrical nerve stimulation (TENS) improves Pain and functional outcomes for patients suffering from Type I complex regional pain syndrome in Upper Extremity
- **Methods**-: The study included 32 patients with complex regional pain syndrome (CRPS) Type I in the upper extremities. The CRPS diagnosis was made in accordance with the International Association for Study of Pain (IASP) consensus statement. Exclusion criteria were as follows: 1) peripheral nerve injury; 2) coexisting conditions, such as diabetic neuropathy, that may result in neuropathic pain; 3) presence of a chronic pain syndrome (e.g. fibromyalgia, phantom pain, rheumatoid arthritis); 4) any disruption of skin and extremity integrity such as burns, 5) any previous treatment for CRPS.
- The patients were randomly divided into two groups: group 1 (n = 16) underwent 20 minutes of traditional TENS treatment, while group 2 (n = 16) underwent 20 minutes of sham TENS treatment. The standard physical therapy program, which included range of motion exercises, a stretching exercises up to the pain threshold, was also conducted in both groups. The assessment of spontaneous pain was done using a visual analogue scale (VAS). Neuropathic pain was evaluated using the Leeds Assessment of Neuropathic Signs and Symptoms (LANSS) scale. A goniometer was used to quantify range of motion (ROM), and volumetric measurements were made to evaluate edema. The Duruöz Hand Index (DHI) and a hand dynamometer were used to evaluate functional capacity. Every measurement was taken both before and after treatment
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Results

- The total study population of 32 patients comprised 16 patients (8 women and 8 men) in group 1, and 16 patients (9 women and 7 men) in group 2. The mean age was 46.07 ± 11.36 years in group 1 and 45.20 ± 15.65 years in group 2. There was no statistically significant difference between groups 1 and 2 regarding age and sex distribution, dominant hand rate ($p > 0.05$)

Comparision of pre and post treatment of VAS, LANNS,Edema ,DHS and grip strength of Group 1 and group 2

	Group 1	Group 2	P value
VAS(0-100mm)			
Pre-treatment (Mean ± SD)	48.36 ± 14.20	43.33 ± 18.91	
Post treatment (Mean ± SD)	13.47 ± 10.11	20.27 ± 15.83	
Change (Mean ± SD)	−34.89 ± 11.81	−23.06 ± 12.24	0.0092
P value	0.0001	0.0008	
LANNS			
Pre-treatment (Mean ± SD)	14.00 ± 5.60	13.53 ± 4.93	
Post treatment (Mean ± SD)	09.42 ± 5.27	10.46 ± 3.16	
Change (Mean ± SD)	−4.58 ± 3.72	−2.07 ± 2.89	0.0414
P value	0.0237	0.0445	
Edema amount (mL)			
Pre-treatment (Mean ± SD)	550.00 ± 47.25	546.00 ± 48.46	
Post treatment (Mean ± SD)	517.00 ± 42.59	515.00 ± 45.82	
Change (Mean ± SD)	−33.00 ± 18.87	−31.00 ± 14.14	0.7119
P value	0.0467	0.0728	
DHS scale			
Pre-treatment (Mean ± SD)	46.67 ± 24.58	45.07 ± 20.31	
Post treatment (Mean ± SD)	16.80 ± 14.20	20.20 ± 14.11	
Change (Mean ± SD)	−29.87 ± 16.06	−24.67 ± 13.67	0.3319
P value	0.0002	0.0004	
Grip strength (kg)			
Pre-treatment (Mean ± SD)	8.52 ± 6.75	8.53 ± 7.11	
Post treatment (Mean ± SD)	14.27 ± 8.20	13.96 ± 7.46	
Change (Mean ± SD)	5.75 ± 4.34	5.43± 4.46	0.8384
P value	0.0384	0.0435	

Comparison of pre- and post-treatment wrist ROM values between groups

ROM	Group1	Group 2	P value
Flexion			
Pre-treatment (Mean ± SD)	45.56 ± 21.93	43.20 ± 24.50	
Post treatment (Mean ± SD)	58.45 ± 12.21	56.40 ± 15.47	
Change (Mean ± SD)	12.89±9.78	13.20±10.88	0.9330
P value	0.0488	0.0784	
Extension			
Pre-treatment (Mean ± SD)	42.77 ± 19.24	42.67 ± 21.94	
Post treatment (Mean ± SD)	56.67 ± 16.82	55.20 ± 16.14	
Change (Mean ± SD)	13.9± 9.82	12.53± 10.21	
P value	0.0376	0.0757	0.7016
Radial deviation			
Pre-treatment (Mean ± SD)	14.00 ± 6.46	13.06 ± 6.64	
Post treatment (Mean ± SD)	18.00 ± 4.21	17.33 ± 4.81	
Change (Mean ± SD)	4.00 ± 3.38	4.73 ± 4.51	
P value	0.0467	0.0423	0.6271
Ulnar deviation			
Pre-treatment (Mean ± SD)	20.33 ± 9.15	20.27 ± 8.71	
Post treatment (Mean ± SD)	27.13 ± 6.32	26.26 ± 6.04	
Change (Mean ± SD)	6.80 ± 5.44	5.99 ± 6.29	0.6996
P value	0.0205	0.0312	

DISCUSSION

In this study, significant improvements were achieved in spontaneous and neuropathic pain scores, edema, ROM and functional capacity. Pain and hyperalgesia are the most commonly encountered symptoms in patients with CRPS. The vicious cycle of pain and immobility can be broken with pain relief, which prevents its previous inhibitory effect on movement. In conclusion, the addition of TENS to a physical therapy program can improve the effectiveness of treatment on spontaneous pain, neuropathic pain, edema, and ROM in the management of CRPS Type 1.

Conflict of interest- None

References