

Research Article

Comparative analysis of analgesic effects of ALTENS and conventional TENS on Tennis Elbow patients

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ABSTRACT

Objectives: This study is aimed to find the comparative effectiveness of ALTENS and conventional TENS or high frequency TENS in reducing pain of the patients with Tennis elbow, also called lateral epicondylitis.

Material and Methods of data collection: Patients were selected from physiotherapy O.P.D., UIHS, CSJM University, Kanpur. Doctors and physical therapist that were posted there were requested to refer patients complaining of pain at lateral epicondyl of elbow.

A total of 120 patients were included in this study based on inclusion criteria. The purposive and random sampling techniques were used for sampling. Patients were divided in two groups Group-A and Group-B. Each group had 30 patients.

The Visual Analog Scale (VAS), were used to measure the outcomes. The pre-test measurements were performed at baseline and post test measurement at the end of 15th day sessions (14 sessions with one Sunday off).

Results: The VAS scores in the ALTENS group showed a significant improvement after 15 days of treatment when compared with conventional TENS both at rest and during activity .The p-value for average scores when compared from Pre to Post treatment using Wilcoxon Signed rank test was less than that of 0.05 which indicated significant change from Pre-score to Post-Score in Group A. Since p-value for Mann-Whitney U test for average scores at post evaluation, when compared between Group A and Group B, was less than that of 0.05 which indicated significant difference between Group A and Group B.

Conclusion: Result of this study showed that ALTENS is more effective in reducing pain of tennis elbow patients when compared with conventional TENS. The treatment program may also lead to additional benefits in their daily living activities, functionality, and working life.

Keywords: Tennis Elbow, lateral epicondylitis, TENS, ALTENS, Acupuncture TENS

1.Introduction

Tennis elbow is also referred as lateral epicondylitis . This is a condition during which the lateral epicondyl of the elbow becomes painful and tender.¹ The pain can also extend to the back of forearm and the grip strength can also be weak.^{2,1} Onset of symptom is

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usually gradual.² Golfer's elbow may be a similar condition but it affects the medial epicondyl of elbow.¹ It generally occurs due to excessive use and accumulated micro trauma of extensor carpi radialis brevis muscle.² Typically this happens as a result of over use during work or sports, classically racquet sports.^{1,2} The diagnosis is usually supported by symptoms with medical imaging. We have to rule out other potential causes.² It is more likely that pain increases when a person tries to bend back the wrist, when the wrist is held in neutral position.¹ A powered screwdriver can cause this injury if overused one-handed. It is classified as a chronic tendinosis, not a tendinitis.¹ The choice of treatment for a private patient is usually supported by personal experience of the treating physician. Injections, splinting, and physiotherapy modalities are the main conservative treatments.³ The most widely used rehabilitation modalities include immobilization, splinting, thermotherapy, TENS, ultrasound, phonophoresis, iontophoresis, LASER, electrical stimulation, acupuncture, manipulation, soft tissue mobilization, friction massage, stretching and strengthening exercises.⁴

Physiotherapy treatments, including exercise and mobilization, may provide short term pain relief but show minimal benefit over rest and advice, making this a less cost effective treatment option.^{5,6,7} Consequently, a requirement exists for interventions that can provide pain relief without adverse effects and it should be cost effective also. Transcutaneous electrical nerve stimulation (TENS) is a cheap, safe, non-drug analgesic that is advocated as an adjunct to other treatments for musculoskeletal pain and promotes self management by patients.^{8,9} A meta-analysis of randomised placebo controlled trials showed TENS to be efficacious when applied adequately in patients with painful chronic musculoskeletal conditions.¹⁰ TENS is assumed to produce analgesia through stimulation of afferent peripheral nerves and therefore, subsequent activation of the pain gate mechanism within the medulla spinalis and the descending pain inhibitory mechanisms including endogenous opiates within the medulla spinalis and brain stem.^{11,12} Explicit anti-inflammatory action is not widely acknowledged, although some people have argued that TENS may affect local tissue healing also.¹² The aim of this comparative study was to research whether ALTENS, or conventional TENS is more useful in providing pain relief and functional improvement compared with medical care management alone. In physiotherapy OPD, a written consent including permission for review of medical records, and a baseline questionnaire before randomization was worked out. Patients who were not eligible according to the inclusion criteria and who did not give consent to continue participation, got medical advice on managing their elbow problem consistent with usual practice.

2.Methodology

This includes information about patients, design, instrumentation and protocol used in data collection.

2.1 sample:

Patients for study were recruited from physiotherapy OPD of UIHS CSJM university.

Age, gender and other demographic data were obtained from patient's interview. Subjects freely volunteered for trial gave written informed consent. Once consent was obtained, assessments of the trial outcome measures, using standard assessment forms, were undertaken. After the baseline measurements were carried out, an administrative assistant was assigned to the

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intervention groups according to the randomization scheme. The baseline record included age, gender, hand dominance, duration of symptoms, manner of onset of pain, precipitating trauma, previous management, history of diabetes and previous history of tennis elbow pain.

The purposive and random sampling techniques were used for sampling. The patients, who were able to fulfill the purpose of the investigation, after screening with VAS scale and according to the inclusion criteria, were selected for the study.

2.2 Inclusion criteria: Patients diagnosed with tennis elbow in age group between 20 to 50 years. Both male and female had no neurological deficit or abnormality with normal forearm and hand sensation.

2.3 Exclusion criteria: Patients on pain killers, any recent or previous nerve injury, Skin allergy or open wounds, history of inflammatory arthritis, pacemaker, Pregnant women, hypersensitive to current and Non cooperative patients were excluded.

2.4 Design:

Total 120 patients (60 in each group) were selected for study. They were given 15 days of treatment and selected therapies that is ALTENS for group-A and Conventional TENS for group-B. Duration of treatment was 20 minutes each.

2.5 Pre-test measurement: All patients were tested using pre-test measurement for pain on VAS scale. Visual Analogue Scale (VAS) was used to measure the severity of pain response of patients. It is a 10 cm horizontal line with two ends labelled, no pain (0) at one end and severe pain (10) at other end. The pain intensity is marked on the line which corresponds to severity of pain the patient experiences.

2.6 Post-test measurement: All subjects were tested for pain on VAS scale at the end of 15 days of treatment with TENS.

2.7 Instrumentation: TENS machine.

2.8 Parameters of TENS: ALTENS or acupuncture TENS: Frequency-8 Hz [1-10 Hz], Pulse width-0.2 ms, Intensity-comfortable. Conventional TENS: Frequency-80hertz [50-100 Hz], Pulse width-80 ms, Intensity-comfortable.

2.9 Protocol: Patients were positioned supine on treatment couch for TENS treatment. Patients were asked to report any discomfort during treatment.

3.Data analysis

After data collection and interpretation, appropriate statistical tools and methods were used for obtaining the results of the study. SPSS version 15 software was used to analyze the data.

3.1 Gender

Table 1 Table showing gender distribution in Group A and Group B

	Group A		Group B	
	Number of cases	Percentage	Number of cases	Percentage
Male	26	43.0%	26	43.0%
Female	34	57.0%	34	57.0%

3.2 Occupation

Table 2 Table showing Occupation distribution in Group A and Group B

	Group A		Group B	
	Number of cases	Percentage	Number of cases	Percentage

Computer Professional	5	8.3%	4	6.6%
House wife	32	53.4%	34	56.7%
Service	8	13.3%	7	11.7%
Teacher	6	10.0%	6	10.0%
Worker	9	15.0%	9	15.0%

Visual Analogue Scale (VAS) Score

3.4 Descriptive Statistics:

Table 3 Descriptive statistics for Visual Analogue Scale (VAS) Score

	Groups					
	Group A			Group B		
	Mean	Median	SD	Mean	Median	SD
Rest_Pre	3.45	3.50	1.33	3.70	4.00	1.24
Activity_pre	5.10	5.00	1.42	5.30	5.00	1.39
Rest_post	.00	.00	.00	.60	.50	.67
Activity_post	.60	.00	.87	1.75	2.00	1.10

3.5 Rest:

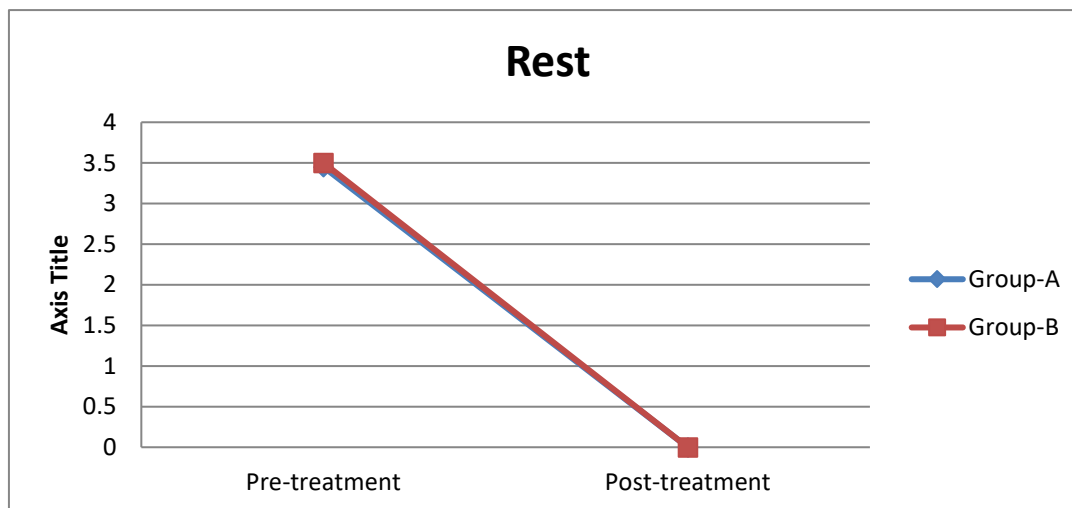


Figure 1 Graph showing descriptive statistics for Visual Analogue Scale (VAS) Score

Pre-Post Comparison:

Table 4 Pre-post comparison

	Group A	Group B
Z	-6.781	-6.832
p-value	.000	.000

Comparison between Groups:

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Table 5 Comparison between groups

	Groups	N	Mean Rank	Sum of Ranks
Pre	Group A	60	57.43	3445.50
	Group B	60	63.58	3814.50
	Total	120		
Post	Group A	60	45.50	2730.00
	Group B	60	75.50	4530.00
	Total	120		

Mann-Whitney U test result:

Table 6 Mann-Whitney U test result

	Pre-treatment	Post-treatment
Mann-Whitney U	1615.500	900.000
Wilcoxon W	3445.500	2730.000
Z	-.999	-6.257
p-value	.318	.000

3.6 Activity:

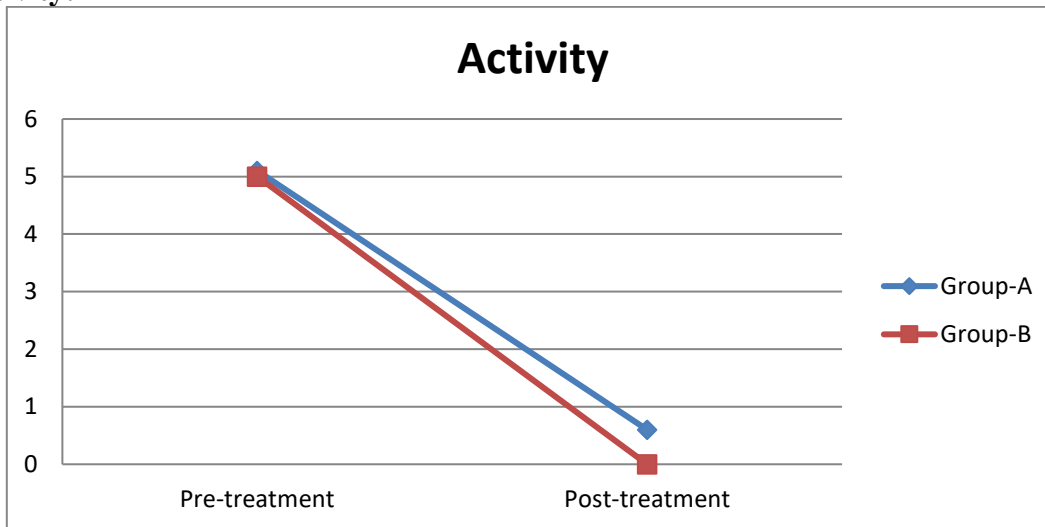


Figure 1 Graph showing pre and post treatment activity

Pre-Post Comparison:

Table 7 Pre-Post comparison

	Group A	Group B
Z	-6.794	-6.858
p-value	.000	.000

Comparison between Groups:

Table 8 Comparison between groups

	Groups	N	Mean Rank	Sum of Ranks
Pre	Group A	60	58.10	3486.00

	Group B	60	62.90	3774.00
	Total	120		
Post	Group A	60	43.33	2599.50
	Group B	60	77.68	4660.50
	Total	120		

Mann-Whitney U test result:

Table 9 Mann-Whitney U test result

	Pre-treatment	Post-treatment
Mann-Whitney U	1656.000	769.500
Wilcoxon W	3486.000	2599.500
Z	-.776	-5.644
p-value	.438	.000

4. Result

Analysis of result showed that the patients in both the groups i.e. Group A where the selected 60 patients were treated with ALTENS and Group B where the selected 60 patients were treated with conventional TENS, were of almost same age.

Analysis also showed that the number of males and females in both the groups were also same i.e. Males – 45 and Females – 15[table1] . All 60 patients in both the groups were right handed . In group-A ,out of all patients, 13.3% were service man,53.4% were house wives,10% were teachers,15% workers and 8.3% were computer professional [table2].]. In group-B ,out of all patients, 11.7% were service man,56.7% were house wives, 10% were teachers,15% were workers and 6.6% were computer professional [table2]. Their baseline demographic characteristic was almost similar in all patients .Patients were tested for any change in pain on VAS ,both during rest and activity [Table 1]

4.1 During rest:

Interpretation using Wilcoxon Signed rank test: The result analysis showed that p-value for average scores when compared for Pre to Post using Wilcoxon Signed rank test is less than that of 0.05 which indicates significance of change from Pre-score to Post-Score in Group A.[Table 4]. Result also showed that p-value for average scores when compared for Pre to Post using Wilcoxon Signed rank test was less than that of 0.05 which indicates significance of change from Pre-score to Post-Score in Group B.[Table 4].

Interpretation using Mann-Whitney U test:

Pre Evaluation: Since p-value for Mann-Whitney U test for average scores at Pre evaluation, when compared between Group A and Group B, is greater than that of 0.05 which indicates no significance of difference between Group A and Group B. [Table5,6]

Post Evaluation: Since p-value for Mann-Whitney U test for average scores at post evaluation, when compared between Group A and Group B, is less than that of 0.05 which indicates significance of difference between Group A and Group B. [Table5,6].

4.2 During activity:

Interpretation using Wilcoxon Signed rank test: Since p-value for average scores when compared for Pre to Post using Wilcoxon Signed rank test is less than that of 0.05 it indicates significance of change from Pre-score to Post-Score in Group A. [Table 7].Result showed that Since p-value for average scores when compared for Pre to Post using Wilcoxon Signed rank test

is less than that of 0.05 it indicates significance of change from Pre-score to Post-Score in Group B. [Table 7]

Interpretation using Mann-Whitney U test:

Pre-Evaluation: Since p-value for Mann-Whitney U test for average scores at Pre evaluation, when compared between Group A and Group B, was greater than that of 0.05 which indicated no significance of difference between Group A and Group B. . [Table 8,9]

Post Evaluation: Since p-value for Mann-Whitney U test for average scores at post evaluation, when compared between Group A and Group B, was less than that of 0.05 which indicated significance of difference between Group A and Group B. . [Table 8,9]

Thus we found that both the TENS such as ALTENS and Conventional TENS are effective in reducing pain of the patients. But ALTENS is more effective with additional benefits of improvement in functionality and activities of daily living.

5. Discussions

Tennis Elbow or lateral epicondylitis is a condition described by pain and tenderness in the lateral epicondyle of elbow. It is caused by repetitive overuse of extensor muscles of the wrist.¹³ TENS may be a non-pharmacological treatment method for painful conditions. TENS may be a common modality for treating musculoskeletal pain.¹⁴ TENS excites large-diameter afferent fibres.¹⁵ According to gate control theory¹⁶, TENS may stimulate the large-diameter afferent fibres, which can reduce the transmission of pain signals through the tiny nociceptive afferent fibers, thereby inhibiting pain discrimination and perception. TENS has been shown to supply antinociceptive effects almost like those of acupuncture^{17,18} with slow onset and gradual offset that persists after the stimulation stops.¹⁹ ALTENS excites small-diameter afferent fibres.^{20,21} Almost like descending inhibition and/or diffuse noxious inhibitory controls (DNICs) within the brain system, ALTENS may stimulate the tiny diameter afferent fibres, which can reduce the transmission of pain signals, thereby inhibiting pain discrimination and perception.²²

This study assessed the consequences of ALTENS and conventional TENS on Tennis elbow patients for further clinical trials. Both groups showed decrease in pain (VAS scores) when evaluated after 15 days of treatment, but group-A showed very promising improvement in reduction of pain as compared to group-B. There are some limitations of the study regarding the acute and chronic phases of the patients condition. Here the improvement was observed but further the acute and chronic conditions can be taken into consideration separately. This study included two variety of TENS, so any combination therapy like using Ultrasound with TENS or other modalities can also be used for study.

6. Conclusion

This study concludes that ALTENS is very effective in reducing pain of the patients with tennis elbow as compared with conventional TENS. The effectiveness was found both during rest and activity. The treatment program may also lead to additional benefits in their daily living activities, functionality, and working life.

7. References

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