International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Comparative Study of Ultrasound and Tens in the Management of Tennis Elbow

Sharick Shamsi[1], Shabana Khan[2], Faisal M. Alyazedi[3], Nezar Al-Toriri[4], Abdulmohsen Hassan. Al Ghamdi[5]

[1]Physiotherapist in Ortho OPD at Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia
[2]Lecturer at Raj Nursing and paramedical College, Gorakhpur, U.P. India
[3]Prince Sultan Military Medical City, School of Allied Health Professions, Riyadh- Kingdom of Saudi Arabia
[4]Clinical Supervisor in Ortho OPD at Prince Sultan Military Medical City, Riyadh – Kingdom of Saudi Arabia.
[5]Director of Physiotherapy Department, Prince Sultan Military Medical City, Riyadh, Kingdom of Saudi Arabia.

Corresponding Author: Sharick Shamsi

Received: 11/03/2015 *Revised: 11/04/2015* *Accepted: 14/04/2015*

ABSTRACT

Study Objective: Comparative Study of Ultrasound and TENS in the Management of Tennis Elbow.
Design: Pre & post test control group design.
Method and Measurements: 30 patients from Raj Nursing Home [Age group 25-55 yrs] who were diagnosed with Tennis elbow, with onset >1-3 months were randomly assigned to either group A receiving US and group B receiving TENS . Treatment was given for 10 sessions for the period of 5 week. Before treatment and after 5 weeks of treatment pain was assessed on VAS and MPQ.
Results: Subjects in-group A that received Ultrasound showed greater Improvement in pain compared with the TENS group on 5th week compared with pre treatment. ($p<0.050$)
Conclusion: The result of study suggests that Ultrasound improves the symptoms of Tennis elbow. TENS also improved the pain symptoms but was too small to reach satisfactory outcome for patients. Based on these results Ultrasound should be the treatment of choice for Tennis elbow rather than TENS.

Key Words: Ultrasound, TENS, Tennis elbow,

INTRODUCTION

Tennis elbow was first used over a century ago to describe a painful condition observed in English lawn tennis players. As a group, tennis players are at a higher risk to develop lateral epicondylitis and some 40 - 50% of them experience this disabling condition, at least once during their playing life time. [1]

Tennis elbow also known as lateral epicondyle pain, is the inflammation of the extensor carpi radialis brevis tendon. Daily activity such as carrying, lifting and gripping are commonly affected by such pain. Pain is common health problem in the world. [2]

Tennis elbow is traditionally considered to be self limiting, but may last for 6-18 months. Its estimated prevalence in general population is 3-7%. Workers undertaking repetitive tasks are at greater risk, representing between 35-64% of all cases. More than 40 treatments have been proposed for tennis elbow some of which

have been investigated in clinical trials and systemic reviews. [3]

Ultrasounds (US) refer to mechanical vibrations, which are essentially the same as sound waves but of a higher frequency. US is a deep penetrating modality capable of producing changes in tissue through both thermal and non thermal (mechanical) mechanisms. Depending on the frequency of the waves, US is used for diagnostic imaging, therapeutic tissue healing or tissue destruction. [4]

The reason why TENS has a modulating effect on pain is that it is associated with blocked nociceptive transmission in the spinal cord. [2]

There is no evidence regarding the benefit of using electrotherapy modalities such as interferential, IR, even though these modalities are commonly used in physiotherapy practice.

The guidelines and recent systematic reviews of therapeutic US have highlighted a need for further research to investigate the true effect of these modalities in the context of well conducted randomized controlled trials. As the application of US may have adverse effects for patients with tennis elbow (e.g. because of the transmission of thermal energy).

The aim of Study was to investigate the effects of US with pre-defined doses, on pain intensity and function in patients with Tennis elbow.

MATERIALS AND METHODS

Subjects: 30 patients from Raj Nursing Home [Age group 25-65 yrs] who were diagnosed with tennis elbow, at least three month were included in the study randomly assigned to either group A receiving US and group B receiving TENS. Treatment was given for 10 sessions for the period of 5 week. Before treatment and after 5 weeks of treatment pain was assessed on VAS. All the subjects were clinically evaluated by a doctor. Patient with history of cardiovascular disease, liver disease, kidney disease, other organ diseases, and/or complaints of pain in the areas other than elbow, were excluded. Patients, with problems in the care of the electrical stimulation and with skin allergic to electrodes, were also excluded from the study. [2]

Design: Study utilized pre & post test control group design.

Equipments & Measuring Tools:

Examination table, US machine, US gel, TENS machine, VAS scale, MPQ, Pillow.

Interventions:

Subjects in each group received 10 sessions of treatment, each around 20 minutes, during a period of 5 weeks. All treatment, Ultrasound delivery, and TENS prescription was provided by qualified and experienced physiotherapist who were instructed by the researcher about study protocol.

Ultrasound treatment procedure and technique

Before starting treatment a consent form was given to patients and benefits and risks of procedure including sensations expected during procedure were explained to them. They were positioned (Sitting or lying) with additional pillow support comfortably and assessed thoroughly. Time and intensity was kept at '0' before switching on power. Patients were also instructed to report any excess heat or pain.

Gel was applied to skin and surface of transducer. US head is moved in overlapping circles, rate of transducer movement is 3-4cmsq. Dose of US was 1w/cm^2 with frequency of 1MHz in continuous mode, 1MHz was chosen due to its increased penetration depth. Treatment lasted eight minutes over the effected radiated region. [5]

Placebo Ultrasound

Patients in placebo group received same duration of Ultrasound with the apparatus switched on (so that patients see lights flashing on machine) but without any current output. In this way, patients were blinded for Ultrasound treatment.

TENS Procedure

The TENS device used in this study is just like other TENS. Two rubber electrodes (2 cm in diameter) were placed on two acupoints on the subjects elbow. The intensity of stimulation was adjusted at a tolerable level for each subject. Patients were treated for fifteen minutes per visit 2 times a week for 5 weeks. [2]

The patients were treated for 10 sessions for period of 5 week. Pain was assessed by VAS and MPQ before starting treatment and on 5th week of post treatment session.

In VAS Patients were asked to describe their pain status on a 10cms line where left end represents no pain and right end represents maximum pain.

MPQ consists of a set of pain descriptor list, and are read to a patient with the explicit instruction that he chooses only those words which described his feelings and sensations at that moment.

PRI is based on the rank values of words. In this scoring system, the word in each subclass implying the least pain is given a value of 1, the next word is given a value of 2, etc. The rank values of words chosen by a patient are summed to obtain a score separately for the sensory (subclass 1-10), affective (subclasses 11-15), evaluative (subclass 18) and miscellaneous (subclasses 17-20) words, in addition to provide a total score (subclasses 1-20).The PPI is recorded as a number and is associated with the following words 1-mild, 2-discomforting, 3-distrcession, 4- horrible, and 5-excruciating.

Data Analysis: All Data was analyzed using statistical test-pair t test. Mean and SD for pre R_x and after 5th week Rx pain values were calculated for each group. Significance was accepted at 0.05 level of probability.

Findings:

In this study 30 patients participated with a mean age of 46.65±14.45 in group A (M, n=7; F, n=8) and 44.75±14.23 in Group B (M, n=7; F, n=8) ranging from 25 to 65 years (Table 1). Sex was matched in both the groups.

Table1: Mean and SD of age between group A and B.

	Group A (N=15) Mean±SD	Group B (N=15) Mean±SD
Age (Yrs)	46.65±14.45	44.75±14.23

Mean reduction in PRI, PPI &VAS of group A & B with p & t values:

Mean reduction in PRI (Table 2,)

Both groups had significant difference in pre R_x to 5th week values as t and p values for group A and B were t=14.47, p=0.000 and t=10.53,p=0.000 respectively (table 2).

Table 2: Mean reduction in PRI values between group A and B. Mean and standard deviation at pre treatment, 5th week and pre treatment to 5th week with t and p values.

Groups	Pre R_x	5th week	Pre R_x to 5th week		
			Mean±SD	Paired t value	P value
Group A (N=15) Mean±SD	22.21±4.16	2.12±1.24	17.75±4.33	14.47	0.000
Group B (N=15) Mean±SD	17.25±4.54	7.55±3.72	7.23±2.53	10.53	0.000

Mean reduction in PPI (Table 3,)

Both groups had significant difference in pre R_x to 5th week values as t and p values for group A and B were t=11.67, p=0.000 and t=10.68,p=0.000 respectively (table 3).

Table3: Mean reduction in PPI values between group A and B. Mean and standard deviation at pre treatment, 5th week and pre treatment to 5th week with t and p values.

Groups	Pre R_X	5th week	Pre R_x to 5th week		
			Mean±SD	Paired t value	P value
Group A (N=15) Mean±SD	4.65±0.63	0.51±0.54	2.62±0.81	11.67	0.000
Group B (N=15) Mean±SD	4.32±0.63	1.52±0.67	1.86±0.64	10.68	0.000

Mean reduction in VAS (Table 4,)

Both groups had significant difference in pre R_x to 5th week values as t and p values for group A and B were t=19.04, p=0.000 and t=12.25,p=0.000 respectively (table 4).

Table 4: Mean reduction in VAS values between group A and B. Mean and standard deviation at pre treatment, 5th week and pre treatment to 5th week with t and p values.

Groups	Pre R_X	5th week	Pre R_x to 5th week		
			Mean±SD	Paired t value	p value
Group A (N=15) Mean±SD	7.63±1.24	0.43±0.46	6.49±1.26	19.04	0.000
Group B (N=15) Mean±SD	6.57±1.41	2.81±1.15	2.95±0.86	12.25	0.000

Thus, it can be concluded from above results that both interventions (US and TENS) were effective in Pain reduction as reflected by VAS and MPQ .But, Patients (group A) that received US showed greater improvement in pain compared with TENS (group B) on 5th week compared with pre treatment .

DISCUSSION

Our findings confirm that Ultrasound enhances recovery in patients with lateral epicondylitis. Although within group comparison showed improvement with respect to decrease in the pain intensity in both individual groups. Whereas, between groups comparisons showed that Ultrasound group subjects pain intensity was significantly reduced while compared to TENS group.

To avoid heating the treated tissue and achieve non-thermal effects, pulsed ultrasound is used where pulse rates interrupt the sound waves at rates of 50%, 80%, or 90%. Nonthermal (biologic) effects result from mechanical alteration of the local, cellular environment induced by the ultrasound waves. [6]

1-MHz ultrasound is most effective at increasing temperature at a tissue depth of 2.5–5 cm, and 3.3-MHz ultrasound is most effective at increasing temperature at a tissue depth of 1.0–2.5 cm. [7]

Most of the publications regarding the application of therapeutic ultrasound suggest treatment periods of 5–10 minutes duration. [8]

Raising the temperature of tissue to ≥3°C decreases the viscoelasticity of collagen, facilitating more effective stretching of tissue. [9]

forearm band was effective for pain and functional improvement along with the conventional physiotherapy management comprised of the pulsed mode ultrasound therapy with a 20% duty cycle at the frequency of 1 MHz and intensity of 2 W/cm^2 for a duration of 7.5 minutes and the strengthening and stretching exercises. [9]

It is believed that tens influences pain through different pathways. One of these pathways is the gate-control theory. [10]

The potential prognostic value of TS and DNIC on the pain inhibitory effect of tens is based on this rationale. However, opioid pathways that involve peripheral, spinal and supraspinal mechanisms. [11,13]

Tens may influence pain through the electrical stimulation of low-threshold A-beta cutaneous fibers, the responsiveness of central pain-signaling neurons of OAk patients who are centrally sensitized is augmented to the input of these electrical stimuli. [14]
These all study findings support the results of the present study.

CONCLUSION

This study has shown that for the group of patients involved Ultrasound is effective in the treatment of Tennis elbow than TENS.

ACKNOWLEDGEMENT

I want to thank Dr. Abhishek Yadav, Director of Raj Nursing Home, Gorakhpur, India, without his help this study would not have been possible.

Author's Contributions:

All authors participated in the design of the trail and the drafting of the manuscript. All authors have read and approved the final manuscript.

REFERENCES

1. L. Viola, A critical review of the current conservative therapies for tennis elbow (Lateral Epicondylitis) July 1998,ACO Vol-7, Number-2 Page-53-67.
2. C.S.Weng, S.H.SHU, et al. –The Evaluation of two Modulated frequency modes of acupuncture-like TENS on the treatment of Tennis elbow pain-Biomedical Engineering- applications basis & communications- Oct-2005, Vol. 17, No.5 page-236-242.
3. L.S.Chesterton, D.A.V.Windt, J.Sim, et al. –Transcutaneous electrical nerve stimulation for the management of tennis elbow: a pragmatic randomized controlled trail: the TATE trial- Dec-2009-BMC Musculoskeletal disorder - 10:156, page-1-9.
4. Low, J & Reed, A (2000) Electrotherapy explained: - Principles & practice, Butter Worth Heinemann, Oxford (a) 191, 365(b) (195-207.)
5. E. Haker, T. Lundeberg-Plused ultrasound treatment in lateral epicondylalgia, Scand J Rehab Med 1991 23:115-118.
6. Shaji john kachanathu, Divya Mallyan, shibili Nuhmani, sajith Vellapallil-Pulsed Versus Continuous Ultrasound Therapy: As a management of lateral epicondylitis, Innovative journal of Medical and health sciences 3:5 September- October 2013-242-245.
7. Draper DO, Castel JC, Castel D: Rate of temperature increase in human muscle during 1-MHz and 3-MHz continuous ultrasound. J Orthop Sports Phys Ther.1995; 22:142–150.
8. Chan AK, Myrer JW, Measom G, et al: Temperature changes in human patellar tendon in response to therapeutic ultrasound. J Athl Train. 1998;33:130–135.
9. Levine D, Millis DL, Mynatt T. Effects of 3.3-MHz ultrasound on caudal thigh muscle temperature in dogs. Vet Surg. 2001;30:170–174.
10. Kachanathu SJ, Miglani S, Grover D, Zakaria AR. Forearm band versus elbow taping: as a management of lateral epicondylitis. Journal of Musculoskeletal Research.2013; 16(1):1-9.
11. Melzack R, Wall PD: Pain mechanisms: a new theory. Science 1965, 150(699):971-979.
12. DeSantana JM, Walsh DM, Vance C, Rakel BA, Sluka KA: Effectiveness of transcutaneous electrical nerve stimulation for treatment of hyperalgesia and pain. Curr Rheumatol Rep 2008, 10:492-499.
13. DeSantana JM, DM Silva LFS Resende MA, Sluka KA: Transcutaneous electrical nerve stimulation at both high

and low frequencies activates ventrolateral periaqueductal grey to decrease mechanical hyperalgesia in arthritic rate Neuroscience 2009, 163:1233-1241.
14. David Beckwee et. al. Effect of TENS on pain in relation to central sensitization in patients with osteoarthritis of the Knee: study protocol of a randomized of the knee: study protocol of a randomized controlled trial. Bio med central 2012-13:21.

How to cite this article: Shamsi S Khan S, Alyazedi FM et. al. Comparative study of ultrasound and tens in the management of tennis elbow. Int J Health Sci Res. 2015; 5(5):216-221.

****