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A Study to Compare the Effect of Shockwave Therapy and Ultrasound Therapy for the Treatment of Tennis Elbow

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Abstract: ***Tennis elbow (lateral epicondylitis) is a painful condition that occurs when tendons in your elbow are overloaded, usually by repetitive motions of the wrist and arm. Shockwave and Ultrasound are two modalities that are widely employed to treat this condition. The proposed study was designed to evaluate the effect of these modalities individually and compare the effect of two over one other. Methodology: The total duration of the study was 6 months.30 subjects were selected between the age group of 25 - 58 years. These subjects were divided into 3 groups (10 subjects in each group). Group A was given Baseline Treatment and shockwave therapy. Group B was given Baseline Treatment and ultrasound therapy. Group C was given ultrasound and shockwave therapy alternatively including baseline treatment. Baseline treatment consisted of strengthening exercises, braces and icepack. Data analysis: Data analysis was performed using statistical software. Results: Both groups showed significant improvements in terms of VAS (all p values < 0.0001), dynamometer (p = 0.001 vs p = 0.015), algometer (all p values < 0.0001), PRTEE (all p values < 0.0001), QDASH (all p values < 0.0001), and SF - 36 scores (p = 0.001 vs p = 0.005) within time. There was no significant difference between the two groups, except algometer scores in favor of ESWT (p = 0.029). Conclusion: ESWT and therapeutic ultrasound are equally effective in treating tennis elbow. ESWT is an alternative therapeutic intervention and as effective as ultrasound.***

Keywords: epicondylitis, tennis elbow, shockwave therapy

1. Introduction

Tennis Elbow is also known as lateral epicondylitis. It is the most common overuse syndrome in the elbow. Tennis Elbow is a small rupture of the radial wrist extensor tendon due to overuse. Tennis elbow or lateral epicondylitis is a condition in which the outer part of the elbow becomes sore and tender. It is commonly caused by non - inflammatory, chronic degenerative changes (Enthesopathy) in the tendon that attach forearm muscle extensor carpi radialisbrevis (ECRB) to elbow. Contractile overloads that chronically stress the tendon near the attachment on the humerus are the primary cause of tennis elbow. It occurs often in repetitive upper extremity activities such as computer use, heavy lifting, forceful forearm pronation and supination, and repetitive vibration. The area of maximal tenderness is usually an area just distal to the origin of the extensor muscles of the forearm at the lateral epicondyle. Most commonly, the extensor carpi radialisbrevis (ECRB) is involved, but others may include the extensor digitorum, extensor carpi radialislongus (ECRL), and extensor carpi ulnaris. Ligaments involved Radial collateral ligament, lateral ulnar collateral ligament, annular ligament.

2. Aim of the Study

The purpose of this study was to compare the therapeutic efficacy and analgesic effect of both shockwave and ultrasound therapies by assessing the reduction of pain intensity and the decrease in both the functionality and quality of life impairments in individuals suffering from tennis elbow pre - treatment, post - treatment, and at 2 - week follow - up.

3. Objectives of the Study

1) To evaluate the effect of Shockwave therapy on tennis elbow.
2) To evaluate the effect of Ultrasound therapy on tennis elbow.

4. Methodology: Materials and Methods

1) Study design
Experimental design and comparison - based study.

2) Setting
Study was done in outpatient department of Sri Guru Ram Das Charitable Hospital, Amritsar for a period of 6 months.

3) Sample size:
A minimum of 30 subjects were selected for the study, minimum of 10 subjects in each group.

4) Sampling
Simple random sampling.

5) Selection criteria:
All the subjects were selected on the basis of following criteria:

The inclusion criteria:
It involves patients suffering from tennis elbow. Minimum of 30 subjects were selected between age group of 25 - 55 years. The subjects were divided into 3 groups (10 subjects in each group).
Group A were given Baseline Treatment and shockwave therapy.
Group B were given Baseline Treatment and ultrasound therapy

Group C were given Baseline Treatment and ultrasound therapy and shockwave therapy on alternate days.
Baseline treatment consists of strengthening exercises, braces and icepack.

Research population
Subjects in the present study consist of patients divided into three groups suffering from tennis elbow also known as lateral epicondylitis, who visited at Sri Guru Ram Das Hospital.

Patients are equally divided into three groups.
- Group A constitutes the shockwave therapy group.
- Group B constitutes the ultrasound therapy group.
- Group C constitutes of combined (Shockwave + Ultrasound therapy) on alternate days.

Research tools
For the purposes of this research, PRTEEQ i. e., Patient Rated Tennis Elbow Evaluation Questionnaire, NPRS (Numeric Pain Rated Scale), VAS (Visual Analogue Scale), ADL's Scale (Activity of daily living Scale) were taken pre - treatment, post - treatment, and at 2 week follow - up, NPRS consists of a numeric version of the visual analog scale.

Shockwaves were applied to the patients using: For the initial session, the frequency was set to 21 Hz, the pressure at LB bar, and 2000 shocks to achieve analgesia For all the remaining sessions, the frequency was set to 15 Hz, the pressure at 16 bar, and 1500 shocks to achieve therapy.

Therapeutic ultrasound waves were applied to the patients using a frequency of 3 MHz and intensity of 2.5 W/cm.

Plan of care

Phase I - Rest: The most important thing you can do is rest your injured arm.
Cryotherapy/ice pack: 30 minutes or ice massage 7 minutes
Bracing or Elbow support Or Rigid Tapping
Modality: - Ultrasoundtherapy
Intensity: 2.5w/cm 2
Frequency: 3M Hz
Duration: 8 minutes
Mode: Continuous Exercise therapy for strengthening and flexibility started after the pain and inflammation reduced. Isometrics for grip strength, wrist extensors, wrist flexors, biceps, triceps, rotator cuff were performed. Active ROM, elbow flexion, extension, forearm pronation, supination, wrist flexion and extension were performed. Active exercises: Ball squeezing, wrist curls and grip web exercises 10 Reps. Forearm strengthening exercise: Squeeze a racquetball repetitively for forearm and hand strength.

Phase II
Ultrasound therapy+ isometrics + brace at night + active range of motion. Extension exercises of the wrist were the most important stretches to improve the range of motion and to increase the amount of load on the tendon. Repeat 10 times (15 to 20 seconds) Repetition for 2 times a day.
Transverse frictional massage was given.

Phase III
- Isometrics + brace at night + active range of motion+ stretching
- Muscle strengthening with weight cuffs, elbow flexion and extension with therabands.
- Active resisted exercise for increase strength and muscle tone.
- Home care exercise programme
- Stretching exercises = repeat 10 times (15 - 25 seconds)
- Isotonic exercises = repeat 15 times (3 series)
- Stretching exercises = repeat 10 times (15 - 25 seconds)
- Icing = massage the tender area with ice or crushed ice for 10 - 15 min.

Intervention for group B (ultrasound therapy group)
In all the subjects of group B: ultrasound was applied to the patients, for 8 - 10 mins as treatment time, Intensity 2.5W/cm2, Duty factor 50%, Carrier frequency 3 Mhz, Pulse Frequency 100Hz, Power 6.4W to achieve results.

Manual therapy was used from the second week with a frequency of twice a week with the following maneuvers used, Mills manipulation, elbow mobilization with movement, and varus thrust manipulation. After these two weeks of treatment at the clinic, the patient was asked to continue another two weeks home exercise and subsequent outcome evaluation in the clinic.

Intervention for group C
In all the subjects of group C: shockwave +ultrasound therapy were applied together but on alternative days to the patient; which consist of 5 days shockwave and 5 days ultrasound. Shockwaves were applied to the patients with continual frequency 10hz, intensity: 2.0 bar, the pressure at l bar, and 2000 shocks to achieve therapy with ultrasound applied to the patients, for 8 - 10 mins as treatment time, intensity 2.5w/cm2, duty factor 50%, carrier frequency 3 M Hz, pulse frequency 100hz, power 6.4w to achieve results.

To examine the severity of the tennis elbow, there was a dynamometer and a Patient - rated Tennis Elbow Evaluation Questionnaire.

5. Results & Analysis

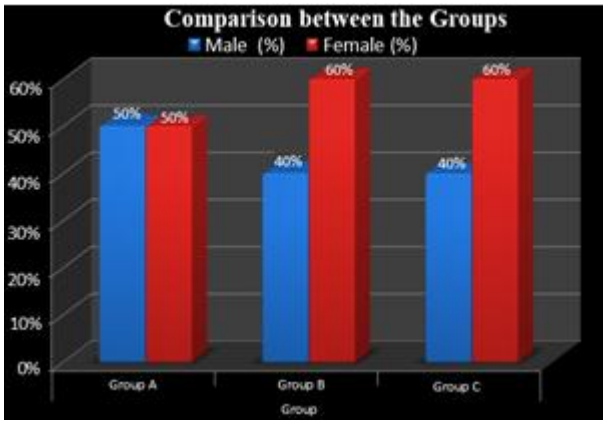

Figure 1: Shows comparison of Age between the groups

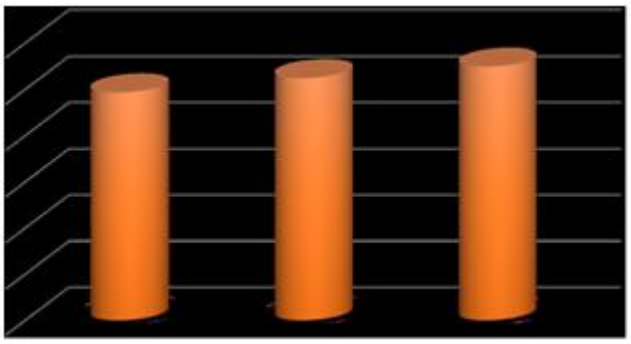

Figure 1.2: Shows comparison of PRTEEQ questionnaire on day 1 and day 10 with in a group A.

6. Discussion

The study was performed with 26 patients with tennis elbow, who were divided into two comparative groups – A and B. Group A consisted of 13 patients (9 women and 4 men) aged 35 to 56 years (a mean age of 45.1 ± 7 years), with body mass ranging from 52 to 120 kg (mean body mass of 75.8 ± 20.9 kg) and body height from 151 to 182 cm (mean height of 168.5 ± 8.2 cm). Five patients had BMI >18.5<25, in 4 it was > 25<30 and in another 4 >30. The right upper extremity was affected in 8 patients and the left upper extremity in 5. Eight patients presented with pain in the dominant extremity and 5 in the non - dominant extremity. In patients in group A, the duration of tennis elbow varied from 3 to 36 months (8.7 ± 9.7 months on average). Group A was treated with radial shockwave therapy.

Group B also comprised of 13 patients (7 women and 6 men) aged 27 to 55 years (a mean age of 45.1 ± 8.8 years), with body mass from 67 to 107 kg (mean body mass of 81.1 ±11.9 kg) and body height from 158 to 187 cm (mean height of 172.5 ± 7.7 cm). Seven patients had BMI >18.5<25, in 5 it was > 25<30, and in 1 > 30. Six patients presented with pain in the right upper extremity and 7 in the left upper extremity. The dominant extremity was affected in 6 patients and the non - dominant one in 7. The duration of the condition varied from 3 to 30 months (8.1 ± 8.9 months on average). Group B was administered ultrasound therapy. The within - group homogeneity of patients' characteristics was tested using Fisher's exact two - sided test, the maximum likelihood chi - square test and the Mann - Whitney U test.

The treatment - induced changes in both groups were analysed statistically using Friedman's ANOVA and the Bonferroni post - hoc test. All changes were compared with the baseline values of the analysed parameters.

The homogeneity of distribution of patients' scores on the Roles - Maudsley scale at weeks 1, 3 and 6 post - treatment was tested with Fisher's exact two - sided test.

The level of statistical significance was $p<0.05$ for all tests.

7. Conclusion

The study demonstrated that radial shockwave and ultrasound therapies are effective in the treatment of tennis elbow, and that their effectiveness is comparable. Radial shockwave therapy in group A gradually reduced the intensity of all types of pain over the observation period. In group B, measurements showed that all types of pain decreased the most after one week of treatment. Pain reduction between weeks 1 and 3 was much smaller and at week 6 only pain felt during activity showed a small decrease, the rest pain and night pain being slightly higher than at week 3.

Both shockwave and ultrasound therapies cause a reduction in the intensity and frequency of pain that persists, improvement in performing ADL's, reduction in NPRS scale, reduction of pain intensity and decrease in both the functionality and quality of life impairments in individuals suffering from tennis elbow, reducing the need for pain medication and improving the function of the treated limb.

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