# Is Wrist Manipulation and Low-Level Lasertherapy Collectively Benificial for Patients with Lateral Epicondylitis?

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## Abstract

**Aim:** The goal of the study is to find the effectiveness of Wrist Manipulation and Low- Level Laser Therapy, Flexibility and Endurance training to reduce pain and improve grip strength in patients with lateral epicondylitis of elbow.

**Method:** A total of 30 subjects with Lateral Epicondylitis (LE),both male and female, between 25 to 50 years were selected and randomly further separated among 2 groups. The 2 separate groups comprised of 15 subjects each (male=7; female=8). Group A received Low-Level Laser Therapy(LLTT), Flexibility and Endurance training and Group B received Low-Level Laser Therapy along with wrist manipulation, flexibility and endurance training for 3 days per week. For both groups, total period of treatment was 4 weeks. Numeric Pain Rating Scale(NPRS) and Grip Strength (GS) were used as pre and post outcome measures.

**Results:** Result of the study suggests improvement in mean value of NPRS and Grip Strength for groups A and B following treatment. The treatment was statically more significant in group B than group A.

**Conclusion:** The study concludes that patients affected with Lateral Epicondylitisreceiving wrist manipulation along with Low-Level Laser Therapy, Flexibility and Endurance training demonstrates significant improvement.

***Keywords:*** *Lateral Epicondylitis, Wrist Manipulation, Low-level Laser therapy, Flexibility, Endurance training.*

## Introduction

Lateral Epicondylitis (LE), more commonly called as “Tennis Elbow”(TE) is an injury caused due to the overuse of wrist extensor tendon that attach along the outer side of the elbow. It may lead to inflammation and cause degenerative changes such as Tendinosis and micro tear of fibrous tissue at these points. It is one of the commonest lesion of forearm. Occurrence of LE is 7-20 times more frequent than medial epicondylitis[1]. It is mainly a recurrent type of injury which is difficult to cope up and can last for several months or weeks. The characteristic episode of tennis elbow average duration lies between 6 months to 2 years. LE is generally related to sport with microscopic and macroscopic tears in Extensor Carpi Radialis Brevis (ECRB), mainly caused due to excessive use, repetitive eccentric contraction and gripping exercises of wrist[1].

The commonly affected is dominant arm with the occurrence of 1-3% in normal population, but this

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increases to 19% at 30-60 years of age. This disorder does not differ between men and women[2.]

There has been a definite clinical presentation; the major complaints are decreased grip strength and pain. With the help of various special tests we can confirm the diagnosis of this condition[3]. The test includes palpation, resisted wrist extension,overuse, passive wrist flexion and resisted middle finger tension[4]. Frequent wrist rotation and extension may produce "repeated minor trauma" and strain in the common extensor area of wrist. The tissue attempts to repair, but continuous contraction of muscle pulls the surfaces separately which leads to repetitive tear. The pathological condition of tendon like "Fibroarigiomatous Hyperplasia" has poor quality, slow to heal and painful[4].

In LE, a dull greyish edematous tissue replaces the normal glistening tendon. This tissue often encompasses the origin of ECRB tendon to the level of the radial head. It was seen the occurrence of pathological changes on the inner side of the extensor aponeurosis in approximately 35% of cases. In 20% calcific exostosis of the lateral epicondyle was present[5.]

Viola L, describedhistopathologic examination of samples obtained from patients with chronic refractory lateral epicondylitisthatshowed vascular abundance and focal hyaline degeneration that is consistent with a generative relatively than an inflammatory process. Histological examination of bone- tendon junction in patient with tennis elbow has shown evidence of a repair response of variable degree, the most frequent feature being mucopolysaccharide infiltration and bone formation[6.]

Traditional treatment program for people with LE have focused primarily on the pain control by Ultrasound, Anti-inflammatory Medication, Iontophoresis and Phonophoresis followed by Rehabilitation program which ranges from flexibility to strengthening and endurance training. Many medical treatments already used for treating LE include Corticosteroid injection, Drug therapies, Electrical stimulation, Laser, Acupuncture, Counterforce bracing and Ergonomics. Surgical treatment is needed only in 5-10% of patients who do not react after many months of conventional treatment[7]. A group of Researcher's conducted a study on manipulation of wrist management for lateral epicondylitis. They concluded that manipulation of wrist is capable of relieving symptoms in LE patients[8].

Similarly, investigators conducted a study of effects from Low- Level Laser Therapy (LLLT) to treat tendinopathy. It was randomized placebo-controlled trials with LLLT. They concluded thatinsub-acute and chronic tendinopathy LLTT is greatly effective[9].

The aim of the present study was to find the efficacy of wrist manipulation procedure along with LLTT and graduated exercise therapy regimen in patients of LE.

## Method

Sample consisted of 30 subjects with LE,with both male and male individual as participants between 25 to 50 years. All participant's obtained a written rationalization of the trial earlier to entry in the study and were given knowledge regarding their consent for participation. Following this subjects were randomly allocated equally into Group A and Group B respectively.

All subjects met the subsequent inclusion criteria of person's between age of 25-50 years, Tennis Elbow patients with Cozens test positive signs and symptoms of Tennis Elbow lasting for greater than 6 weeks, ache over lateral side of elbow and problems in holding objects. Individuals undergone a steroid injection in the past 30 days in elbow, patient's with patho-neurodynamicsround elbow, any history of Rheumatoid Arthritis, Systemic or Neurological disorders were excluded from the study.

Variables: Independent variables were wrist manipulation technique, LLTT, Flexibility and Endurance Training while dependent variables were pain and grip strength.

Two outcome measures, Numeric pain rating Scale (NPRS), Grip Strength (GS) were used in the study. GS was assessed with a handheld Dynamometer

Group A: Subjects of group A obtained LLTT at the Tenoperiosteal junction of the ECRB. LASER machine used configured Mid 1500 IRRADIA, wavelength: 904 nm, mean energy output: 12 MW, peak value: 8.3 W and frequency of 70 Hz (pulse mode). The tender point was dealt with it for 30 sec resulting in a dose of remedy of zero.36 J/point. The subjects were treated for three sitting/week for four weeks.

Group B: Subjects of group B acquired Wrist manipulation method following LLTT. During manipulation of wrist, subject was asked to place his or her affected forearm on the examination table with hand facing downward. Therapist sat perpendicularly

to the patient's affected side and held the subject's scaphoid bone between his thumb and index finger to reinforce the aid of placing the thumb and index finger of the opposite hand. Therapist placed the participant's wrist dorsally by the time he ventrally manipulated the wrist. Entire procedure was repeated for 15 notions. The technique was done twice, by means of either forceful passive extension of the wrist or extension in opposition to resistance. Period of intervention consultation was 15 to 20 minutes. No regulations in use of the arm had been imposed. Each the groups additionally obtained flexibility and endurance training. The protocol was followed 3 times a week for 4 days.

## Results

Results from both groups put to statistical analysis to find the Mean, Standard Deviation, P value, T value and the Statistical significance between NPRS, GS in both groups having Lateral Epicondylitis. There was no significant difference between the groups in terms of age, BM and baseline measurements (NPRS, GS).

**Table 1.1 Comparison of pre and post NPRS score within group A and B.**

| Group | | Mean | S.D. | t value | p<0.05 |
|---|---|---|---|---|---|
| Group A | Pre NPRS | 7.4 | 1.12 | -5.17 | Significant |
| | Post NPRS | 4.4 | 0.91 | | |
| Group B | Pre NPRS | 7.6 | 0.83 | -11.52 | Significant |
| | Post NPRS | 3.6 | 1.055 | | |

Paired sample t-test was used to compare pre and post NPRS value within group A and group B. The table value is less than the calculated t- value. Therefore, the results revealed significant difference between pre NPRS and post NPRS measurements at $p<0.05$

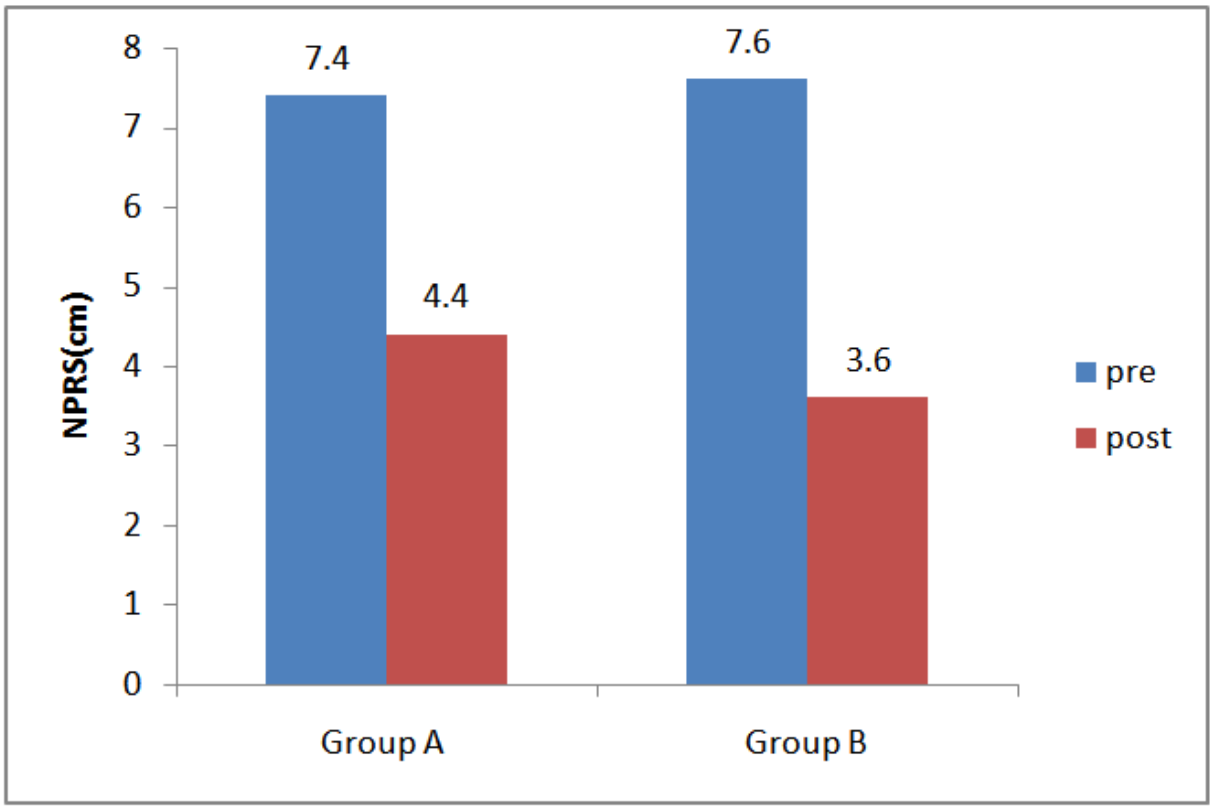


**Figure 1.1 Comparison of Pre and Post NPRS score within group A and B.**

**Table 1.2: Comparison of pre and post grip strength score within group A and B**

| Groups | | Mean | S.D. | t value | p<0.05 |
|---|---|---|---|---|---|
| Group A | Pre Grip Strength | 15.13 | 0.9904 | -5.1667 | Significant |
| | Post Grip Strength | 17.13 | 1.1254 | | |
| Group B | Pre Grip Strength | 15.00 | 1.1952 | -11.529 | Significant |
| | Post Grip Strength | 19.80 | 1.08232 | | |

Paired sample t-test was used to compare the mean for strength in Group A and B. The table value (2.14) is less than the calculated t- value. Therefore, the results revealed significant difference between pre and post strength measurements at $p<0.05$.

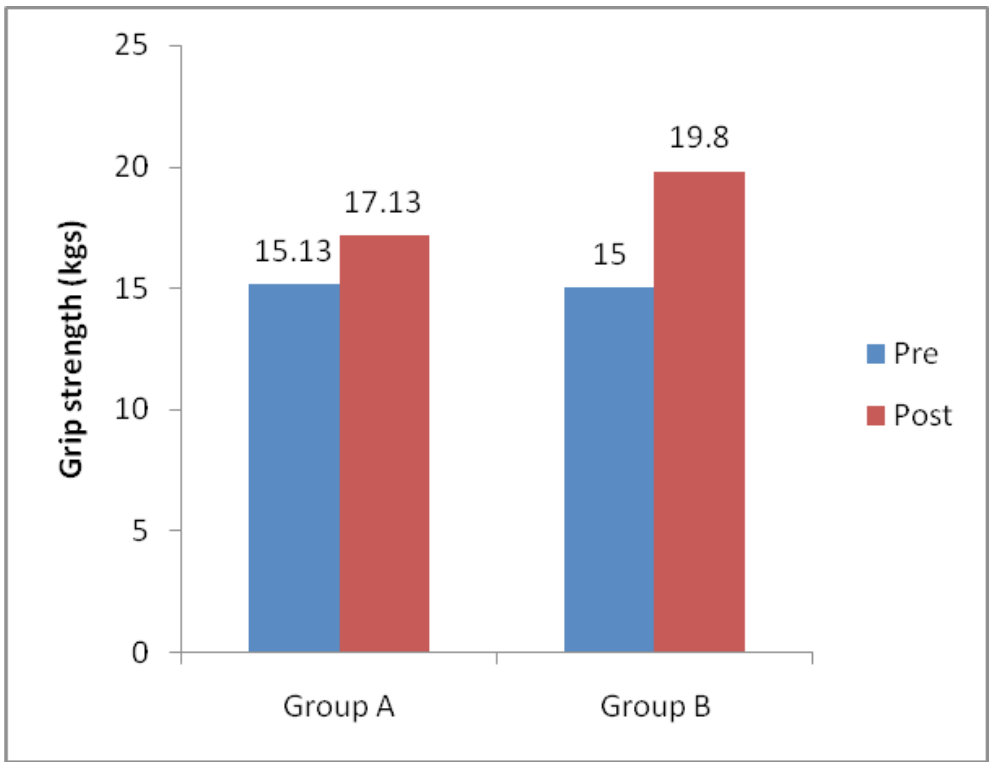


**Figure 1.2 Comparison of Pre and Post Grip Strength score within Group A and B.**

**Table 1.3 Comparison of Post NPRS score between Group A and B.**

| Post NRPS | Mean | S.D. | t value | p<0.05 |
|---|---|---|---|---|
| Group A | 4.4 | 0.9102 | 2.22287 | Significant |
| Group B | 3.6 | 1.0555 | | |

Unpaired sample t-test has been used to compare the mean of post NPRS between group A and B. Mean and Standard Deviation for NPRS scores for Group A after 3 weeks was $4.4 \pm 0.9102$ and for Group B was $3.6 \pm 1.0555$. Table value (2.14) is less than the calculated t- value (2.22287). Therefore, the results revealed significant difference between post NPRS measurements in both groups at $p<0.05$.

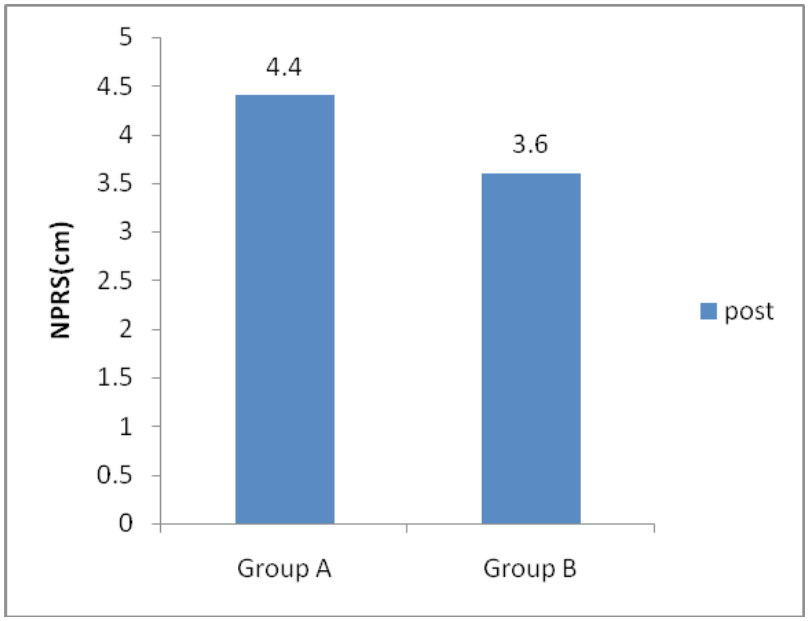


**Figure 1.3 Comparison of Post NPRS score between Group A and B.**

**Table 1.4 Comparison of Post Grip Strength score between Group A and Group B.**

| Post Grip strength | Mean | S.D. | t value | p<0.05 |
|---|---|---|---|---|
| Group A | 17.13 | 1.1254 | -6.614378 | Significant |
| Group B | 19.8 | 1.08235 | | |

Unpaired sample t-test was used to compare the mean of post grip strength between group A and group B. The mean and standard deviation for grip strength scores for Group A after 3 weeks was 17.13 ± 1.1254 and for Group B was 19.8 ± 1.08235. The table value (2.14) is less than the calculated t value (-6.614378). Therefore, the results revealed significant difference between post NPRS measurements in both groups at p<0.05.

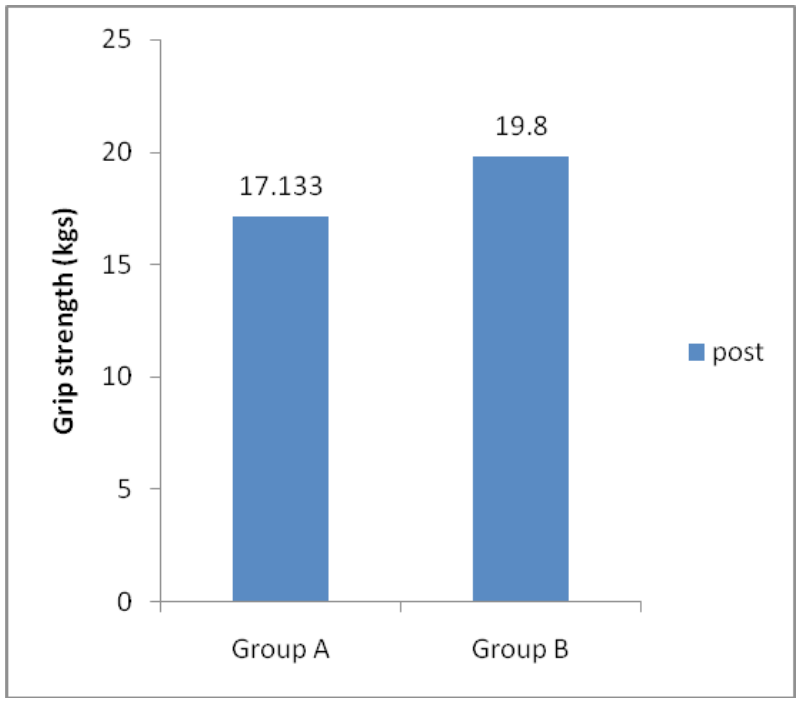


**Figure 1.4 Comparison of Post Grip Strength score between Group A and B**

## Discussion

Findings from this study indicate that subjects in both the groups had significant decrease in pain & increase in grip strength. However, out of the two groups, group receiving manipulation of wrist demonstrated more improvement in both, pain reduction as well as grip strength augmentation.

Result from manipulation of wrist in this study is bolstered with results from previously published trials, where in Strujs PA et al compared effectiveness of Wrist Manipulation with conventional Physiotherapy in managing tennis elbow. They concluded manipulation of the wrist produce more significant results in improving outcomes[1]. Manchanda G et al compared the effectiveness of movement with mobilization and manipulation of wrist in tennis elbow management and validated both to be equally effective in management of LE[7].

Clinical viability of control treatment shown in randomized clinical trials which report benefits in term of relief from discomfort and quick rebuilding of capacity[10 11 12].

This might be because of direct impacts on articular joint structures and transmission of afferent impulses through nociceptive fibers within the CNS and psychological impacts[13].

Ongoing evidence has shown that central nervous system may assume a part in inhibition of pain following joint manipulation[14 15]. Vicenzino et al investigated impact of a Non-Thrust Cervical Lateral Glide in patients with interminable TE[16]. This method helped them gain functional griping,decrease pain pressure threshold and improve the overall circulation induced by sympathetic nervous system. More recently, Paungmali discovered comparative outcomes which revealed sympatho-excitation following mobilization with movement of elbow[17].

Jan M Bjordalconducted a systematic review to find procedure related evaluations and meta-analysis of Low Laser in TE and the conclusion was LLLT managed with ideal measurement of 904 nm and perhaps 632 nm wavelengths specifically to tennis elbow, helps to relive pain and less disability in LE, both alone and in conjunction with an exercise regimen[2].

Sterqioulas Aplanned & executed a study on effect of Low-Level Laser and plyometric exercises as treatment forTE, their results suggested plyometric exercises with LASER therapy to be more significant than other group[18].

Vasseljen O studied TE by applying LLTT versus placebo therapy. They concluded that LLTT to show better effect over placebo group[19].

Haker E etal performed a studied on lateral humeral epicondylgia by applying LASER intervention to the acupuncture points. Follow-ups were done after 3 months and 1 year. They found no differences between LASER and the placebo group[20].

**Clinical Implication:** The result of this study will help physiotherapists to use more effective interventions, in the form of wrist manipulation along with LLTT and conventional physiotherapy to facilitate reduction in pain and improve hand power with maximum holding ability in LE patients.

## Conclusion

This study concludes, wrist manipulation technique along with LLTT, Flexibility and Endurance Training bring sufficient improvement in reducing pain and improving grip strength in patients with LEof elbow.

**Conflict of Interest:** Nil

**Source of Funding:** Nil

Ethical clearance was taken from Institutional Committee Of Maharishi Markandeshwar Deemed to be University.

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