Original Article

# EFFECTIVENESS OF MOBILIZATION WITH MOVEMENT OF ELBOW COMPARED WITH MANIPULATION OF WRIST IN PATIENTS OF LATERAL EPICONDYLITIS

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## ABSTRACT

**Purpose:** To evaluate the effectiveness of mobilization with movement of elbow compared with manipulation of wrist on pain, strength and activities of daily living in patients of lateral epicondylitis. **Methodology:** An interventional comparative study was conducted on 30 patients having symptomatic lateral epicondylitis. They were randomly assigned to one of the three groups. Group A (n=10) control group, Group B (n=10) Mobilization with movement group and Group C (n=10) wrist manipulation. All the 3 groups were received conventional treatment of ultrasound, stretching and strengthening of wrist extensors. Baseline measurements of pain (VAS score), functional status (PRTEE questionnaire) and strength (maximal isometric grip strength) were taken on day 1 and after 10th treatment session. **Results:** The data analysis was performed with Graph Pad Instat trial version 3 software. All three groups showed improvement in VAS, maximal isometrics grip strength and PRTEE questionnaire. There is statistically significant difference between groups B (Mobilization with movement) and Group C (Manipulation of wrist) for VAS and PRTEE questionnaire score. But No statistically significant difference is found in maximal isometric grip strength. Mobilization with movement of elbow along with conventional therapy showed significant improvement in Pain and functional status as compared to wrist manipulation. **Conclusion:** It can be concluded that mobilization with movement of elbow along with conventional therapy program is effective in treating chronic lateral epicondylitis.

**KEYWORDS:** Lateral epicondylitis; Mobilization with movement; Wrist manipulation.

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## INTRODUCTION

Lateral epicondylitis (tennis elbow) is the most frequent type of myotendinosis and can be responsible for substantial pain and loss of function of the affected limb.[1] It specifically involves the origin of the extensor carpi radialis brevis muscle, usually 1-2cm distal to lateral epicondyle.[2]

It is generally work related or sport related pain disorder of the forearm. Repetitive extension-flexion or pronation-supination activity leads to overuse injury. Overuse is encountered when the body's physiological ability to heal lags behind the micro trauma caused by repetitive motion.

It is also seen that flexibility deficiencies in the forearm extensor muscle or inadequate forearm extensor power and endurance to withstand normal forceful repetitive movements is also one of the causes of lateral epicondylitis.[3]

The dominant arm is usually affected, but the condition is occasionally bilateral. Men are more likely to suffer than women.[4] lateral epicondylitis are more common at the age of 30- 55 years.[5]

Conservative treatment program for people with lateral epicondylitis have focused primarily on the pain control by ultrasound, anti-inflammatory medication and phonophoresis followed by rehabilitation program including flexibility and strengthening.

Acupuncture, orthotics, taping, extra corporeal shock wave therapy, LASER and ionization have also been studied for management of lateral epicondylitis.[6] Activity modifications such as avoidance of grasping in pronation and substituting controlled supination during lifting may relieve symptoms.[5]

There are several recommendations regarding prevention, treatment and avoidance of recurrence that is largely speculative including stretching and progressive strengthening exercises to prevent re-irritation of the tendon.[7] there is little evidence to support the value of these interventions for lateral epicondylitis.[8] scientific evidence in favors of any specific treatment for lateral epicondylitis is poor.[9]

Mobilization with movement for lateral epicondylitis is theoretically intended to cause repositioning of 'positional faults'.[10] the mechanism by which manipulation may work is poorly understood. The clinical efficacy of manipulative therapy has been demonstrated in randomized clinical trials which report benefits in terms of pain relief and more rapid restoration of function.[11]

The objective of this study is to evaluate the effectiveness of mobilization with movement of elbow compared with manipulation of wrist on pain, strength and activities of daily living in patients with lateral epicondylitis.

## METHODS

An interventional study was conducted to find out the effectiveness of mobilization with movement of elbow compared with manipulation of wrist in relieving pain, on maximal isometric grip strength and on functional outcome in patients with lateral epicondylitis.

**STUDY SETTING:**

This study was conducted for 6 months duration in physiotherapy department of Government Physiotherapy College, civil hospital, ahmedabad. All the patients were referred from orthopedic outpatient department of civil hospital, ahmedabad.

**SAMPLE SELECTION:**

Total 30 subjects were selected for the study with age group 30 – 55 years and unilateral lateral epicondylitis (symptoms >3months duration).[5] Subjects with Cervical radiculopathy, recent surgical procedure around elbow, subjects have received steroid injection within last 30 days in the elbow, any neurological disorder like stroke, head injury, etc were excluded.[12] Subjects were assigned to Group A: Control group, Group B: Mobilization with movement of elbow group and Group C: Wrist manipulation group according to their order of appearance.

**SAMPLE DESIGN:** Convenience sampling

**MATERIALS:**

Mulligan belt, Dumbbells of different weight, Jamar hydraulic hand dynamometer

**MAIN STUDY:**

Subjects who were found suitable for the participation in the study were requested to sign consent forms. Visual analogue scale (VAS)[13], Patient rated tennis elbow evaluation (PRTEE) questionnaire[14] and Isometric grip strength[15] were taken. Isometric grip strength was measured with Jamar hydraulic hand dynamometer. Mean value of 3 repetitions was recorded. The treatment for each group was continued for 3 weeks during that time they had no other treatment. The patients were treated on alternate day (except Sunday) for 10 treatment sessions. All outcome measures were taken with same protocol after 10$^{th}$ treatment session.

**PROTOCOL:**

**GROUP A: CONTROL GROUP**

Subjects were given conventional treatment program. It includes: Ultrasound: (Pulsed ultrasound with 20% Duty cycle and 3 MHz Frequency is delivered at 1.3 Watt/ cm$^2$ Intensity for 5 minutes) .[16, 17] stretching: Static stretching to forearm extensors should be applied for 30secs. Total 6 repetitions with rest of 30 seconds between each session were given.[7] Strengthening exercise: Perform wrist extension slowly and maintain the position of extension for 2 seconds and gradually return to starting position. Active motion of wrist extension with elbow flexed 90$^0$, 2-3 sets of 10 repetitions were started, progressing to 5 sets of 10 repetitions as tolerated. When subject can perform 50 repetitions without overcompensation of other

muscles 1 pound of weight is added and performed 3 sets of 10 repetition progress to 5 sets. Then add 1 pound of weight and progress till 3 pound weight. As tolerance improves elbow is taken in to extension. [18]

**GROUP B: MOBILIZATION WITH MOVEMENT GROUP**

Subjects were given conventional treatment and Mobilization with movement of elbow. Mobilization with movement was given with subject lying in supine position having their elbow extended and forearm pronated. The therapist was standing at side of subject to be treated. Placing the belt around therapist shoulder and subject's forearm, belt placed closed to elbow joint line. The therapist performed the lateral glide of forearm using belt sustaining this glide, subjects were asked to perform fist without pain.[19] Dosage - 10 Mobilizations with movement in one set. 3 sets were given per session. Treatment was given for 10 sessions.

**GROUP C: WRIST MANIPULATION GROUP**

Subjects were given conventional treatment program and wrist manipulation.

The manipulative maneuver is high velocity low amplitude thrust technique and was performed with affected side forearm rested on a table with the palmar side of the hand facing down. Subject's scaphoid bone is gripped between thumb and index finger by the therapist and wrist is extended dorsally at the same time the scaphoid bone was manipulated ventrally. Dosage – 10 wrist manipulation in one set. 3 sets were given per session. Treatment was given for 10 sessions. [11]

## RESULTS

Data analysis was performed with Graph Pad Instat trial version 3 software.

**DATA ANALYSIS OF VAS SCORE:**

Data was not normally distributed so Wilcoxon matched-pairs signed ranks test was applied for comparison of pre and post treatment VAS score within each group. The results showed significant improvement in each group at $p<0.05$. kruskal wallis test was applied for comparison of post treatment VAS score between Group A, Group B and Group C. The test showed significant difference between groups. Post-hoc Dunn's multiple comparisons Test was applied to substitute the findings.

| Group | Mean rank difference | p value | Significance |
|---|---|---|---|
| Group A & B | 12.25 | < 0.01 | Significant |
| Group A & C | 2.4 | > 0.05 | Not significant |
| Group B & C | 9.8 | < 0.05 | Significant |

**Table no.1:** Comparison of VAS score between two groups.

**DATA ANALYSIS OF MAXIMAL ISOMETRIC GRIP STRENGTH:**

Paired t test was applied for comparison of pre and post treatment maximal isometric grip strength within three Groups as the data is normally distributed. The test showed significant improvement in each group. One way analysis of variance ANOVA was applied to compare post treatment Maximal isometric grip strength between three Groups. P value was found to be 0.2320 (>0.10) which showed that there was no statistically significant difference in maximal isometric grip strength between 3 groups. Post–hoc analysis Bonferroni multiple comparison test was applied to substantiate the findings and result is shown below:

| Group | Mean difference | p value | t value | Significance |
|---|---|---|---|---|
| Group A & B | 4.598 | > 0.05 | 1.287 | Not significant |
| Group A & C | 1.399 | > 0.05 | 0.3916 | Not significant |
| Group B & C | 5.997 | >0.05 | 5.997 | Not Significant |

**Table no.2:** Comparison of Maximal isometric grip strength score between two groups.

**DATA ANALYSIS OF PRTEE QUESTIONNAIRE SCORE:**

Data was not normally distributed so non parametric Wilcoxon matched-pairs signed ranks test was applied for comparison of pre and post treatment PRTEE questionnaire score within three Groups. p value is 0.0020, which is considered significant. kruskal wallis test was applied for comparison of post treatment PRTEE questionnaire score between three Groups. Test showed significant difference between groups. This was further proved by post- hoc analysis Dunn's multiple comparison Test.

| Group | Mean rank difference | p value | Significance |
|---|---|---|---|
| Group A & B | 12.3 | < 0.01 | Significant |
| Group A & C | 1.5 | > 0.05 | Not significant |
| Group B & C | 10.8 | < 0.05 | Significant |

**Table no. 3:** Comparison of PRTEE score between two groups.

The study showed statistically significant difference between groups B (Mobilization with movement) and Group C(Manipulation of wrist) as well as between group A(Control) and group B for VAS and PRTEE questionnaire score. No statistically significant difference is found between three groups in grip strength. No statistically significant difference is found between group A and Group C for VAS and PRTEE questionnaire score.

Mobilization with movement of elbow treatment is significantly effective in relieving pain and improving functional status compared to wrist manipulation and control group in case of chronic lateral epicondylitis.

## DISCUSSION

The results of the present study showed improvement in VAS, maximal isometric grip strength and PRTEE score in all three groups. But the mobilization with movement therapy resulted in significantly better subjective outcomes than wrist manipulation and conventional therapy group in chronic lateral epicondylitis.

Pain declined significantly in MWM group. A Paungmali (2004) showed that MWM produces sensory input sufficient to recruit and activate descending pain inhibitory systems that result in some or all of the pain relieving effects. It produces hypoalgesic effects during and following its application, as well as sympathoexcitatory effect.[20] Bill Vicenzino (2006) hypothesized that malpositioning of the ulna and radius occurs in relation to humerus in tennis elbow, the reduction of pain could be due to repositioning of the ulna and radius with respect to humerus achieved by lateral glide to elbow joint.[21]

Additionally characteristics of a patient's occupation affect the ability to work. Different types of work produce different strains on the upper limb in different patients therefore, the change in ability to work in PRTEE questionnaire noted within each group is important. In MWM group significant improvement occur in functional outcome. Hence improvement in ability to do their usual work occurs. The pain reduction might be resulted in performance of activities, which were painful previously. This was reflected in maximal isometric grip strength as well. Kochar and Dogra(2002) studied the effectiveness of Mulligan mobilization in patients receiving ultrasound and progressive exercise program for 12 weeks. It was found that addition of Mulligan mobilization to this regimen brought increased and faster recovery in patients with tennis elbow.[22] Bisset L et al (2006) showed that physiotherapy involving MWM + exercise had a superior benefit to wait and see approach in the first 6 weeks and to steroid injections after 6 weeks providing a reasonable alternative to injections in the mid to long term.[23] This was in support to the results of present study where Mulligan mobilization had given additional effect on VAS and PRTEE questionnaire score.

The result shows improvement in VAS, maximal isometric grip strength and PRTEE score in wrist manipulation group. B Vicenzino(2003) showed clinical efficacy of manipulative therapy in randomized clinical trials which report benefits in terms of pain relief and more rapid restoration of function. The mechanism by which manipulation works is poorly understood. Manual therapy is used quite often for the spine and peripheral joints, despite of the inability of clinicians to accurately diagnose the pathway at which a manipulation is targeted. In people with low back pain and neck pain, spinal manipulation is thought to free motion segments that have undergone disproportionate displacements and to relax muscles by sudden stretching.[24]

Conventional group showed improvement in VAS, maximal isometric grip strength and PRTEE score. Conventional group received ultrasound, stretching and strengthening. According to Speed CA (2001) pain relief by ultrasound occurs by directly influencing the transmission of painful impulses by eliciting changes within the nerve fibers and elevating pain threshold.[25]Whereas indirect pain reduction occurs as a result of increased blood flow and increased capillary permeability to the affected area.

According to Byl NN (1992) cycloaminoglycan and hydroxyproline which were the essential components for collagen production were increased following low dose pulsed ultrasound. Cavitation and acoustic streaming facilitate collagen synthesis. This increased rate of collagen synthesis in tendon results in healing and increased tensile strength of tendon.[25] Binder A et al (1985), studied the effectiveness of ultrasound in lateral epicondylitis patients. This study compares ultrasound with placebo. It showed improvement in pain score, weight lifting test and grip strength.[26]

In contrast, Robertson and Baker (2001) reviewed studies of effectiveness of ultrasound in lateral epicondylitis patients from peer-reviewed journals between 1975 and 1999. Because of small sample size or other problems, they were forced to discard 25 of the studies and therefore reported findings based on 10 articles reporting clinical outcomes. Of these 10 articles, only 2 reported that ultrasound is more effective than placebo. Robertson and Baker concluded that the literature shows that ultrasound is no more effective than placebo.[27]

According to Pienemaki et al (1996), Strengthening the damaged attachment of wrist extensors resulted in better repetitive wrist movements performed by the subjects.[12] Stretching minimizes excessive internal strain to the tendon by optimizing tissue extensibility during stressful activities. Literatures suggest that strengthening and stretching both are main components of exercise program, because tendons must have flexibility along with strength. Positive effects of exercise program for tendon injuries may be attributable to lengthening of muscle tendon unit by stretching and strengthening exercise which could achieve loading effect within muscle tendon unit along with hypertrophy and increased tensile strength of the tendon.[7]

The result of present study shows no statistically significant improvement in wrist manipulation group compared to mobilization with movement group in VAS and PRTEE score. Geetu Manchnada et al (2008) found that both manipulative techniques are equally effective than conservative treatment. That study included subjects with lateral epicondylitis duration of 1-3 months.[28] In the present study subjects were taken with duration of complain more than 3 months. The effectiveness of wrist manipulation may even be underestimated due to difference in duration of complain.

The result of present study shows no statistically significant difference in maximal isometric grip strength between three groups. It may be due to that mobilization with movement and wrist manipulation works on pain component rather than strength directly.[20, 24]

### LIMITATIONS

The sample size was small so the results could not be generalized to population; long term follow up was not carried out; Short study duration and only chronic cases were taken.

## CONCLUSION

The study concluded that there is significant improvement in pain and functional status in mobilization with movement group than wrist manipulation. The advantage of MWM of elbow is that it is effective within short period. It also improves the ability of patients to maintain their daily activities without restriction. It might be more cost-effective due to a reduction in number of treatment sessions needed.

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**Conflict of interest:** **None**

## REFERENCES

1. De Smedt T, de Jong A, Van Leemput W, Lieven D, Van Glabbeek F,et al. Lateral epicondylitis in tennis: update on aetiology, biomechanics and treatment. Br J Sports Med.2007, Nov; 41(11):816-9.
2. Simon bell.Elbow and arm pain. In: Karim khan & Peter brukner, et al. clinical sports medicine.3rd edition.New Delhi: TATA McGraw-hill publishing company limited; 2007:289,293-7.
3. Zuluaga M. The elbow complex. In: zuluaga M. Sports physiotherapy - applied science and practice. Churchill Livingstone;p. 416.
4. Wadsworth TG.Tennis elbow- conservative, surgical and manipulative treatment.Br Med J. 1987, 294:p.621-24.
5. Kevin wilk et al.Elbow injury.S.Brent Bratzman. clinical orthopedic rehabilitation.2nd edition.p.104.
6. VAL Jones. Physiotherapy in management of tennis elbow. northen general hospital.Sheffield(UK): 2009.

7. D. Stasinopoulos, Stasinopoulos MI. Johnson. An exercise Programme for management of lateral elbow tendinopathy.Br. J. Sports Med. 2005, 39,944-7.
8. Hastings H (1999). "Lateral tennis elbow: "Is there any science out there?"". Journal of Shoulder and Elbow Surgery. 8 (5): 481–91. doi:10.1016/S1058-2746(99)90081-2. PMID 10543604.
9. H Labelle, R Guibert, J Joncas, N Newman, M Fallaha, C H Rivard, et al. Lake of scientific Evidence for the treatment of lateral epicondylitis of the elbow:an attempted meta analysis. British Editorial Society of born & joint surgery.1992, 74-B(5):646-651.
10. Mulligan R.B. Manual therapy "NAGS", "SNAGS", "MWMS", etc.3rd ed. Wellington, New Zealand: Plane view service.1995:78-88.
11. Stratifies P. Manipulation of wrist for management of lateral epicondylitis- a randomized pilot study. Phys Ther. 2003, 83:608-16.
12. Pienimaki T,Tarvainen T K,Siira PT,Vanharanta H.Progressive Strengthening and Stretching Exercises and Ultrasound for chronic Lateral Epicondylitis.Physiotherapy.1996, 82:9.
13. Scott J,Huskisson E C.Graphic representation of pain.Pain.1976, 2:175-84.
14. Rompe JD,Overend TJ ,MacDermid JC.Validation of the Patient rated tennis elbow evaluation questionnaire.J Hand Ther.2007, 3-10
15. Mathiowetz, V, Weber, K. Volland, G.Kashman N."Reliability and Validity of Grip and Pinch Strength Evaluations,".The Journal of Hand Surgery. 1984, 9A: 22-26.
16. Hoppenrath T, Ciccone CD.Is there evidence that phonophoresis is more effective than ultrasound in treating pain associated with lateral epicondylitis? Phys Ther.2006, 86:136-140.
17. Cameron MH.Physical Agents in Rehabilitation.2nd ed.In:St Louis, MO: WB Saunders Co; 2003,202 -11.
18. Andrews, Kevin E. wilk.ch 7.physical rehabilitation of injured athletes. 3rd edition.p.174.
19. J H Abbott, C E Patla, R H Jensen.The initial effects of an elbow mobilization with movement technique on grip strength in subjects with lateral epicondylalgia.Manual Therapy.2001,6(3):163-9.
20. A Paungmali,Shaun O'Leary,T Souvlis,B Vicenzino,et al.Hypoalgesic and Sympathoexcitatory effects of Mobilization with movement for Lateral Epicondylalgia.Physical Therapy.2003, 83:374-383.
21. Bill Vicenzino,Aatit Paungmali, Pamela Teys. Mulligan's mobilization-with-movement, positional faults and pain relief: Current concepts from a critical review of literature.Manual Therapy, 2006.
22. Kochar M,Dogra A.Effectiveness of a specific physiotherapy regimen on patients with tennis elbow.Physiotherapy.2002, 88:333-41.
23. Bisset L,Vicenzino B.The initial effects of a Mulligan's mobilization with movement technique on range of movement and pressure pain threshold in pain-limited shoulders. Manual Therapy.2003, 11: 1-6.
24. BVicenzino.Lateral epicondylalgia:A musculoskeletal physiotherapy perspective. Manual therapy. 2003, 8(2):66-79.
25. Speed CA.Therapeutic ultrasound in soft tissue lesions.Rheumatology.2001, 40:1331-36.
26. A Binder,G Hodge,AM Greenwood,BL Hazleman,DP Pagethomas,et al. Is therapeutic ultrasound effective in treating soft tissue lesions?.British Medical Journal.1985, 290:512-14.
27. Robertson V,Baker, K.A review of therapeutic ultrasound.effectiveness studies. phys. ther.2001, 81:1339-50.
28. Geetu Manchanda, Deepak Grover. Effective-ness of movement with mobilization compared with manipulation of wrist in case of lateral epicondylitis. Indian J phys Occup ther.2008.

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