

Efficacy of Laser Therapy in Lateral Epicondylitis: A RCT

Manpreet Kaur, Reena Arora, Lalit Arora, Sandeep Kumar

University College of Physiotherapy, Baba Farid University of Health Sciences, Faridkot, Punjab

E-mail: reenalalit@gmail.com, lalitarora1635@gmail.com

Abstract - Lateral epicondylitis is the most common lesion of the elbow. It is usually defined as the tendinitis of the extensor carpi radialis brevis (ECRB). The term 'lateral epicondylitis' or 'tennis elbow' is widely used to describe an overuse injury that is characterized by pain and tenderness over the lateral epicondyle. At present various interventions are available to treat lateral epicondylitis. However, there are not many studies that have analysed the effects of mobilization with movement and low level laser therapy in the treatment of lateral epicondylitis. The aim of the study was to find out the efficacy of mobilization with movement (MWM) combined with low level laser therapy (LLLT) in the treatment of lateral epicondylitis. Thirty subjects were randomly assigned into 2 groups. Both groups received treatment for 5 sessions per week for 3 weeks. Group A (experimental group) received mobilization with movement combined with low level laser therapy, whereas Group B (control group) received low level laser therapy. Outcome measures were assessed by using PRTEE (Patient Rated Tennis Elbow Evaluation) scoring and grip strength. Patients were assessed at day 1 and after every 5 days for 3 weeks. Study showed significant ($p < 0.05$) decrease in pain, improvement in functional status and grip strength in both groups. But the reduction in pain, improvement in grip strength and functional status was more significant in Group A than Group B. Combination of mobilization with movement and low level laser therapy proved more effective treatment in lateral epicondylitis than low level laser therapy alone.

Keywords - Lateral Epicondylitis, MWM, LLLT, PRTEE, Grip Strength.

I. INTRODUCTION

Lateral epicondylitis or tennis elbow is a commonly encountered problem in orthopaedic practice. It has been found to be the second most frequently diagnosed musculoskeletal disorder in the upper extremity in a primary care setting [1]. It is the most common lesion of the elbow. It is usually defined as the tendinitis of the extensor carpi radialis brevis (ECRB). The term 'lateral

epicondylitis' or 'tennis elbow' is widely used to describe an overuse injury that is characterized by pain and tenderness over the lateral epicondyle. Most of the cases diagnosed, as lateral epicondylitis is the result of a work related "repetitive strain injury" [2]. The main clinical presentation and the chief complaints in tennis elbow are decreased grip strength, decreased functional activities, and increased pain, which may have significant impact on activities of daily living [3]. Pain is aggravated or triggered off by pronating the forearm fully and extending the wrist against resistance with the fist clenched and elbow extended [4]. The annual incidence of lateral epicondylitis in general practice is four to seven cases per 1000 patients, with a peak in patients 35-54 years of age. Dominant arm involvement is most common. Men and women are equally affected [5].

It is generally a work related or sport related pain disorder usually caused by excessive quick, monotonous, repetitive eccentric contractions and gripping activities of the wrist [6]. Currently, degeneration of the origin of the ECRB, repeated micro trauma and incomplete healing response has been accepted as the cause of lateral epicondylitis by most of the researchers [7]. Another accepted cause has been angiofibroblastic degeneration; infiltration of local autologous blood may provide necessary chemical modifiers of cellular activity known to be mitomorphogenic which are helpful in healing [8]. Traditional treatment program for people with lateral epicondylitis have focused primarily on the pain control by ultrasound, anti-inflammatory medication, iontophoresis, phonophoresis, is followed by rehabilitation program which ranges from flexibility to strengthening and endurance training. Numerous treatments have been tried for lateral epicondylitis including drug therapies, corticosteroid injection, electrical stimulation, acupuncture, counterforce bracing, splintage etc. Surgical treatment is needed in 5-10% of

patients who did not respond after many months to conservative treatment. However, no one treatment has been found to be universally efficacious [2].

Mobilization with movement (MWM) is effective in the treatment of lateral epicondylitis [5]. Mobilization with movement is a technique of manual therapy interventions that combines sustained manual accessory joint gliding with the physiological movement of the joint [9]. The technique is indicated if during its application, it enables the impaired joint to move freely without pain [10]. Immediate reduction in pain and earlier return to function are claimed as results of Mulligan's mobilization with movement which is widely used in management of musculoskeletal disorders [11].

LASER is an acronym that stands for light amplification of stimulated emissions of radiation. Low level laser therapy (LLLT) is a common electro physical modality used in clinical practice for the management of lateral epicondylitis. LLLT seems to be effective in promoting tissue healing and pain control, which may involve various mechanisms. Laser can be categorized as either high or low power, depending on the intensity of energy they deliver. The potential applications for low level lasers include treatment of tendon & ligament injury, arthritis, edema reduction, soft tissue injury, ulcer and burn care, scar tissue inhibition and acutherapy [12,13].

Outcome measures were assessed by using PRTEE scoring and grip strength at baseline (1st day) and after every 5 days for 3 weeks. PRTEE is known as Patient Rated Tennis Elbow Questionnaire. It is a 15 item questionnaire designed to measure pain and disability in patients with lateral epicondylitis. The PRTEE allows patients to rate their levels of tennis elbow pain and disability from 0 to 10 and consist of 2 subscales pain scale and functional subscale [14]. The reliability of PRTEE is 0.89 [15]. Grip strength is a useful outcome measure which is measured with Hand held Dynamometer. Subjects were instructed to squeeze the dynamometer to the point where they first experience pain and then release. It has good interobserver reliability, with an intraclass correlation coefficient of 0.97-0.98 [16].

Various studies have been done for the treatment of lateral epicondylitis [2,5,6,13]. Mobilization with movement and low level laser therapy are one of them, but no study has compared these two. The present study

was undertaken with the intention to compare the effectiveness of mobilization with movement and low level laser therapy in lateral epicondylitis.

II. MATERIAL AND METHODS

This study was approved by Research and Ethical committee of University College of Physiotherapy, Faridkot. 30 patients were taken from the OPD of University College of Physiotherapy, Faridkot referred from the Department of Orthopaedic, GGS Medical College and Hospital Faridkot, based on inclusion and exclusion criteria. Informed consent was signed by each participant. A randomized controlled trial with equal randomization (1:1 for two groups) was done. Patients were divided into two groups based on randomization with 15 patients in each group. Randomization was done by using Random number tables, with allocation concealment by opaque sequentially numbered sealed envelopes. Inclusion criteria included patients between age 25-55 years, both male and female, patients having pain over the lateral epicondyle, patients with positive 'Cozen's test' or 'Mill's test', symptoms should be one to three months old. Patients having history of elbow surgery, history of fracture of ulna, radius and humerus, received steroid injection within last 30 days in elbow joint, cervical spine dysfunction, radial tunnel syndrome, patients who received physiotherapy previously for the treatment of lateral epicondylitis, patients on analgesics for the lateral epicondylitis are excluded.

The diagnosis was confirmed by using Cozen's test and Mill's test.

Cozen's test:

Patient's elbow was stabilized by investigator's thumb placed on lateral epicondyle. Patient was asked to make a fist, pronate forearm, radially deviate and extend the wrist against the resistance. Test was considered to be positive when sudden severe pain occurred in the area of lateral epicondyle of humerus [17].

Mill's test:

Patient's forearm was passively pronated, wrist fully flexed and elbow was extended while palpating lateral epicondyle. Pain over lateral epicondyle of humerus was indicated as positive test [17]. Patients were included in the study if one of the above tests were found to be positive on examination.

Initial assessment was taken at baseline (1st day) for PRTEE scoring and grip strength. PRTEE is a 15 item questionnaire and consists of two subscales i.e. pain scale and functional scale. Patients were allowed to rate their level of pain and disability from 0 to 10. Grip strength was measured in pounds with hand held dynamometer and patients were instructed to squeeze the dynamometer to the point where they first experience the pain and then release. Total of three measures were taken with 30 seconds rest intervals between each. The mean value of the repetitions was calculated and it represented the patient's pain free grip strength. Then follow up assessment was taken at 5th day, 10th day and 15th day.

III. INTERVENTIONS

Group A (experimental group):

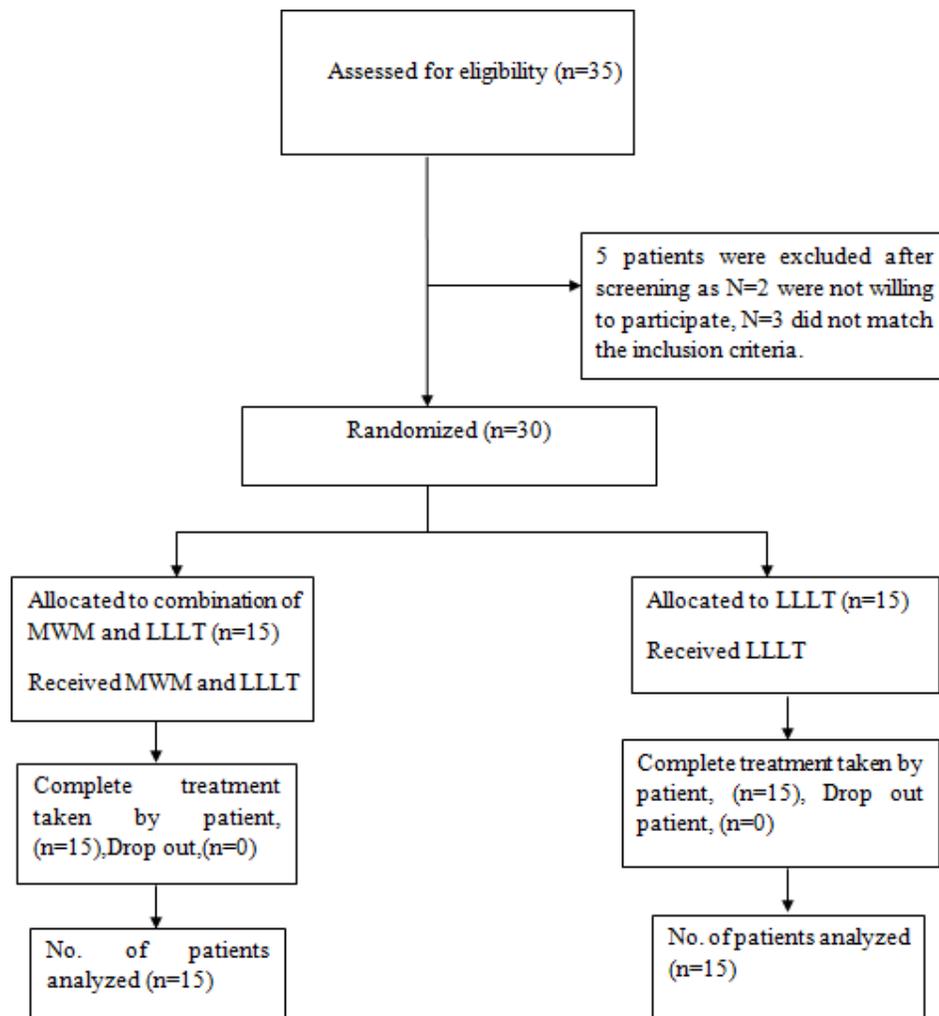
15 patients who received combination of mobilization with movement and low level laser therapy for 5 sessions per week for three weeks, total 15 sessions were given. Firstly, the patients were treated with mobilization with movement. The patients were positioned in supine lying. Patients received mobilization with movement with their elbow extended and forearm pronated. The therapist stabilized the distal part of the arm and a sustained lateral

glide of the proximal forearm was applied. The patients were asked to make a fist as the therapist maintained the lateral glide. The 12 repetitions in one set with a rest period of 15 seconds in between each set, 3 sets per session for 5 days per week were given [5]. Mobilization with movement is followed by low level laser therapy. Ga-Al-As (semiconductor) laser was used to deliver low level laser therapy. The patients were in comfortable sitting position with the involved arm abducted and elbow flexed resting on a pillow. Therapist and patients wore protective goggles during treatment. The lateral epicondyle was irradiated using the direct contact method with laser probe held perpendicularly on the surface of the skin. The lateral epicondyle was irradiated using the low level laser therapy with following parameters: wavelength of 650 nm and 810 nm, power 500 mW and ambient temperature 50° C-400° C laser with an irradiation time of 10 minutes [18].

Group B (control group):

15 patients received low level laser therapy alone for 5 sessions per week for three weeks, total 15 sessions were given. Ga-Al-As (semiconductor) laser was given same as for group A [18].

FLOW CHART OF PROCEDURE



IV. DATA ANALYSIS

The data was analyzed by using SPSS software. Paired and Unpaired t test was done to compare the effectiveness of MWM and LLLT in lateral epicondylitis. Paired t test and unpaired t test done for variables pain free grip strength and PRTEE scoring within group A and group B, and between group A and group B variables. ANOVA was used for within group comparison of both groups. Post Hoc Test was used for multiple comparisons within both groups.

V. RESULTS

Result was analyzed using SPSS, t test was used to compare the results between the two groups. The result was considered significant with $p < 0.05$. Total 30 subjects participated in this study (16 males and 14 females) with age group of 25-55 years in both groups. Unpaired 't' test was done between Group A and Group B to analyze the significance of age. There was no significant difference in the age group. Paired 't' test was performed within group A and group B. Within group comparison of Grip Strength has been done. There was significant difference in Grip Strength within group A and group B at $p < 0.05$. Within group comparison of PRTEE scoring has been done. There was significant difference in PRTEE scoring within group A and group B at $p < 0.05$. Unpaired 't' test was performed between group A and group B to analyse the significance of Grip Strength at 1st, 5th, 10th and 15th day. The calculated value of t was greater than table value, this shows that there is significant improvement between group A and B in Grip Strength from 1st day to 15th day, the mean difference of 1st day is 4.98, the mean difference of 5th day is 2.11, the mean difference of 10th day is 12.54 and the mean difference of 15th day is 22.80 at $p < 0.05$. Next Unpaired 't' test was performed between group A and group B to analyse the significance of PRTEE scoring at 1st, 5th, 10th and 15th day. The calculated value of 't' was greater than table value, this shows that there is significant improvement between group A and B in PRTEE scoring from 1st day to 15th day, the mean difference of 1st day is 5.06, the mean difference of 5th day is 9.00, the mean difference of 10th day is 15.30 and the mean difference of 15th day is 22.33 at $p < 0.05$. ANOVA was used for within group comparison and post hoc test was used for multiple intragroup comparisons for both

groups. ANOVA was performed between and within values at 1st, 5th, 10th and 15th day in group A and group B to analyze the significance of Grip Strength and PRTEE scoring. Within group comparison of Grip Strength has been done. In both the groups there was significant difference in Grip Strength between values on 1st, 5th, 10th and 15th day at $p < 0.05$. Within group comparison of PRTEE scoring has been done. In both the groups there was significant difference in PRTEE scoring between value on 1st, 5th, 10th and 15th day at $p < 0.05$. Post Hoc test has been done for multiple comparison within group A and group B to analyze the significant difference between values of Grip Strength and PRTEE scoring at different time period. There was significant difference within group A and B at $p < 0.05$.

VI. DISCUSSION

This study concluded that both combination therapy i.e. mobilization with movement (MWM) and low level laser therapy (LLLT) and low level laser therapy alone are effective in reducing pain, improving grip strength and functional status. However, it was concluded that Group A i.e. MWM and LLLT is more effective than Group B i.e. LLLT alone. Subjects who received combination therapy showed improved grip strength and functional status and decreased pain after 3 weeks of the treatment as compared to those subjects who received LLLT alone. The study by Manchanda & Grover (2008) [2] supports the present study. He studied the effectiveness of movement with mobilization compared with manipulation of wrist in case of lateral epicondylitis and he concluded that both techniques are effective in the treatment of lateral epicondylitis. Mobilization is thought to produce sensory input sufficient to recruit and activate descending pain inhibitory systems that result in some or all of the pain relieving effects.

The study by Anap (2012) [19] also supports the present study. The aim of the study was to see the effectiveness of mobilization with movement as an adjunct to conventional physiotherapy treatment of lateral epicondylitis. The result of the study shows that both groups were effective for pain relief and dysfunction associated with chronic lateral epicondylitis. But improvement with manual therapy group was greater as compared to conventional group. The greater

improvement achieved in the group treated with MWM may be due to the fact that MWM technique is capable of producing hypoalgesic effect by the end of 3rd week.

The study by Faisal (2013) [18] is also consistent with the present study. He studied the effect of low level laser therapy versus phonophoresis in the management of lateral epicondylitis. The study shows that LLLT as well as phonophoresis has significant effect on the symptoms of lateral epicondylitis.

The limitations of the study were as follows:

The sample size for the study was small, study period is less and follow up period is short. Future scope: Longer follow up can be studied by increasing study period, study can be performed with large sample size and study can be undertaken with other outcome measures.

VII. CONCLUSION

This study concluded that both combination of MWM and LLLT and LLLT alone are found to be effective in lateral epicondylitis. However, it is concluded that reduction in pain, improvement in grip strength and functional status was more in patients who received combination therapy (MWM and LLLT).

VIII. REFERENCES

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