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Effect Of Eccentric Strengthening V/S Mulligan Mobilisation On Pain And Grip Strength In Tennis Elbow

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ABSTRACT :

Background : Lateral Epicondylalgia (LE) is a condition with complex aetiological and pathophysiological factors. LE is characterized by pain at the lateral aspect of the elbow, commonly associated when wrist or finger extension is resisted and while performing gripping activities.[1] It is the most frequent cause of pain in the lateral side of elbow. The result of pre reading of grip strength of both groups is 39.27 & 34.73 pounds with P 0.126 and post reading of both groups is 49.27 & 39.47 pounds with P 0.000, which gave result of increased in grip strength in mulligan mobilization more over than eccentric strengthening. **Conclusion:** The study concludes that the manual mobilization with movement is effective in reducing pain and increasing grip strength than that of eccentric strengthening.**Keywords**: LE (Lateral Epicondylalgia), NPRS (Numerical Pain Rating Scale), MWM (Movement with mobilization), ROM (Range of Motion)

INTRODUCTION

Lateral Epicondylalgia (LE) is a condition with complex aetiological and pathophysiological factors. LE is characterized by pain in the lateral aspect of the elbow, commonly associated with activities involving resisted wrist or finger extension and all gripping activities.[1] It is one of the most frequent causes of lateral elbow pain. It is commonly due to more quick, monotonous, cyclic eccentric contractions and activities involving wrist gripping.[2]

The first description of lateral epicondyle was given by Runges dates from 1873 and 10 years later, owed to the perceived association with lawn tennis. It was named 'lawn tennis elbow'. Over the time this was changed to 'tennis elbow'.[3]

Various occupational factors are involved with the occurrence of the lateral elbow tendinopathy including lifting loads >20 kg at least 10 times/day and repetitive movements >2 hrs/day. The

literature indicates that the disorder does not involve an inflammatory process but rather impairements of the pain and morphological changes in the structures of both the extensor carpi radialis brevis muscle and tendon.[3] Injury to the extensor tendons at the elbow due to overuse results from repeated microtrauma to the tendon leading to disruption and degeneration of the tendon's internal structure.

It appears to be a degenerative condition in which the tendon has failed to heal properly after repetitive microtrauma injury.[4] The peak incidence of this condition occurs between the ages of 35-50 and usually affects the dominant hand. The syndrome is most prevalent 35-64% of all cases in jobs requiring repetitive manual tasks, it results in restricted function, and it is one of the more costly of all work related illnesses.[5] The symptoms of tennis elbow include pain and tenderness in the bony knob on the outside of your elbow. Injured tendons connect to the bone where the bony knob is present. Radiation of pain may be seen into the upper or lower arm. The damage is in the elbow, but it is likely to hurt when doing things with hands.[6]

Types of treatment which helps in lateral epicondylitis are:[6]

- Icing the elbow to alleviate pain and swelling. Experts recommend doing it for 20 to 30 minutes every 3 to 4 hours for 2 to 3 days or until the pain is gone.
- Using an elbow strap to protect the injured tendon from further strain is also suggested by doctors.
- Taking NSAIDS (non steroidal anti inflammatory), such as ibuprofen, naproxen, or aspirin, to help with pain and swelling. However, these drugs can cause side effects, such as bleeding and ulcers.
- Performing range of motion exercises to reduce stiffness and increase flexibility.[6]

Tests for Lateral Epicondylitis; [4]

Cozen's Test (Method 1)

Mill's Test (Method 2)

Middle finger test(Method 3)

Research believes there is component in the rehabilitation, in adjunct to training eccentrically that decreases pain and improve daily functional activities more than eccentric training alone in patients with tendinopathy.[1] Strengthening eccentrically loads the musculotendinous unit to induce hypertrophy and increase tensile strength thus reducing the strain on tendon during movement. A greater stimulus to produce collagen is provided by eccentric contraction and it trains the tendon to withstand a greater force than encountered in the inciting activity

In a similar study by Svernlov and Adolfsson, they compared 12 weeks of contract relax stretching to eccentric strengthening for lateral epicondylitis. At the end of three months, both groups had less pain and increased grip strength, but there were no significant differences between eccentric strengthening and contract relax groups two. However, at six months, 71% of subjects in the eccentric group had completely recovered compared with only 39% in the stretching group; the eccentric group had significant improvement in grip strength.[7]

Movement with mobilization is a system of manual therapy intervention developed by Brain Mulligan which combines a sustained manual gliding force to a joint with concurrent physiologic (osteokinematic) motion of the joint, either actively performed by the operator. The force used manually, or mobilization, theoretically aims to reposition the bony positional faults. The intent of movement with mobilization is to restore range of motion at joints which have painful restriction of range of motion (ROM). Therein lies one of the key aspects of the mobilizations with movement systems: a trial of movement with mobilization at the time of the initial examination will conclude whether MWM is an appropriate therapeutic intervention for that patients dysfunction. The specific MWM utilized in this study was 'the MWM for the tennis elbow' described by Mulligan (1992). The technique involves a laterally directed gliding force to the ulna of the affected extremity, the humerus stabilized, while the patient concurrently performs an active, painfree, wrist range of motion. The movement is performed actively and is determined by comparable sign. A comparable sign is the movement that reproduces the patient lateral elbow pain. This is established at the first examination, prior to the application of the MWM. For LE, this is typically either making fist, gripping an object, wrist extension with or without radial deviation (resisted or unresisted), or extension of middle and/or index fingers (resisted or unresisted) (LaFreniere 1979; Kushner & Reid 1986; Wadsworth et al. 1989; Yaxley & Jull 1993; Noteboom et al. 1994; Mulligan 1995; Vicenzino & Wright 1996).[8]

Dynamometric measurements of the grip strength is highly reliable in tennis elbow by (Bohannon 1999; Nitschke et.al. 1999) although Stratford et.al. (1993) report that the coefficient of reliability for measurement of pain free grip strength by dynamometer (0.87) was superior than maximum grip strength (0.60).

Numeric Rating Scale (NRS) For Pain: The NRS for the pain is an undimentional measure of pain intensity. The NRS is a segmented numeric version of the visual analogue scale (VAS) in which a respondent selects a whole number (0-10 integers) that best reflects the intensity of their pain. The common format is a horizontal bar or line.

MATERIALS AND METHODOLOGY

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This study was designed to find out effectiveness of Eccentric Strengthening v/s Mulligan Mobilisation on pain and grip strength in tennis elbow. The objectives of the study were to find effectiveness of eccentric strengthening & mulligan mobilisation in tennis elbow, and also to compare the study of eccentric strengthening and mulligan mobilisation in tennis elbow. The study was done at physiotherapy OPD patients diagnosed with tennis elbow in both gender male and female age 20-60 years were included in this study. Cardiovascular diseases, neurological impairments, previous or current trauma to the elbow region, previous or current surgery to the elbow region, peripheral nerve entrapment, cervical radiculopathy, corticosteroid injection within 6 months were the exclusion criteria for this study. Study design was a comparative study. Requisite permission and approval was obtained from head of the institution and institutional ethical committee before the commencement of work and the study was carried out for six months.A convenient sampling method was used for current study. Sample size came out to be 30. The Outcome Measures used for the study were NPRS Scale and a grip dynamometer (Jammar).

PROCEDURE

- **Ethical clearance was obtained and subjects were screened.** All subjects were signed the written consent form prior to participation. **The study was explained to the subjects in simple words.**
- **The assessment form requirements of demographic data (Name, Age, Gender, Dominance, Occupation) was filled from subjects. Pain score by NPRS was documented and grip strength was also noted before and after treatment in both the groups.**
- **Cozen test was performed on subjects to check out the diagnosis of tennis elbow.**
- **The subject from 30 sample size was divided into 2 groups of 15 each by randomization.**
- **Group A: subjects were treated with mulligan mobilization.**
- **Group B: subjects received eccentric strengthening.**

  Procedure for group A: Subjects were instructed to lie supine on a treatment table/ sit comfortably on chair. Pain and grip strength was assessed before the mobilization. Therapist then performed the MWM, consisting of a laterally directed manual pressure to the proximal medial forearm while the subjects perform the comparable sign motion (Mulligan 1995). Based on mulligan suggestion (1995), up to four attempts were allowed to find out the direction of the manual pressure that eliminated the comparable sign on the affected side. The direction of manual pressure which eliminated the comparable

sign was applied to the elbow. Total time for per subject was of approximately 15 minutes. After the treatment again the immediate, the pain score was removed by NPRS and also grip strength was measured with the help of Jammar Dynamometer.

- **Procedure for group B: Group B receive a supervised eccentric strengthening of the wrist extensors. Pain and grip strength was measured prior to the exercises. It was performed in the seated position with full elbow extension, forearm pronation, and maximum wrist extension. From this position the patient slowly lowered wrist into flexion for a count of 30, using the contralateral hand to return the wrist to maximum extension. Patients were instructed to continue the exercise even when they experience mild discomfort and to stop the exercise if the pain is worsen and becomes disabling. For whom the eccentric exercise could be performed without minor discomfort or pain, the load was increased using free weights based on the patient 10 RM (Repetition Maximum). Three sets of ten repetitions will be performed during each treatment, with one minute rest interval between each set. Patients were also provided with education manual regarding ergonomics and activity modification technique to avoid aggravation of symptoms. Immediately, the pain score was assessed by NPRS and also grip strength was measured with the help of Jammar Dynamometer.**

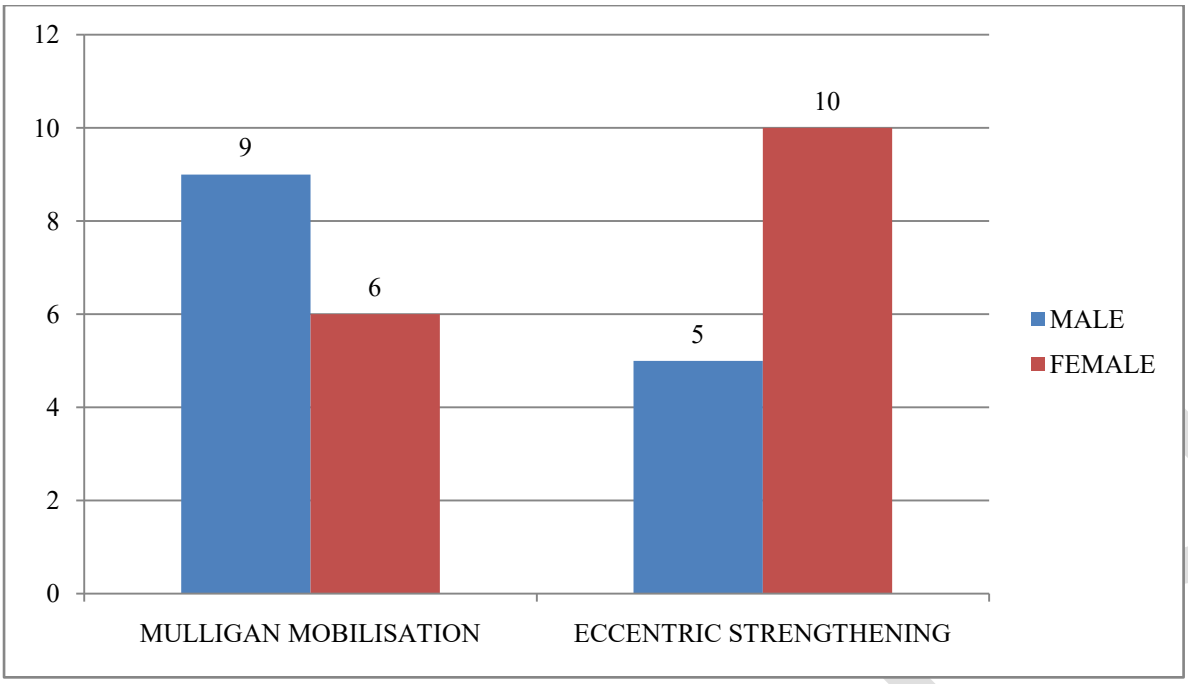
DATA ANALYSIS

GENDER DISTRIBUTION

TABLE NO. 1:

	MALE	FEMALE
MULLIGAN MOBILISATION	9	6
ECCENTRIC STRENGTHENING	5	10

GRAPH NO. 1:

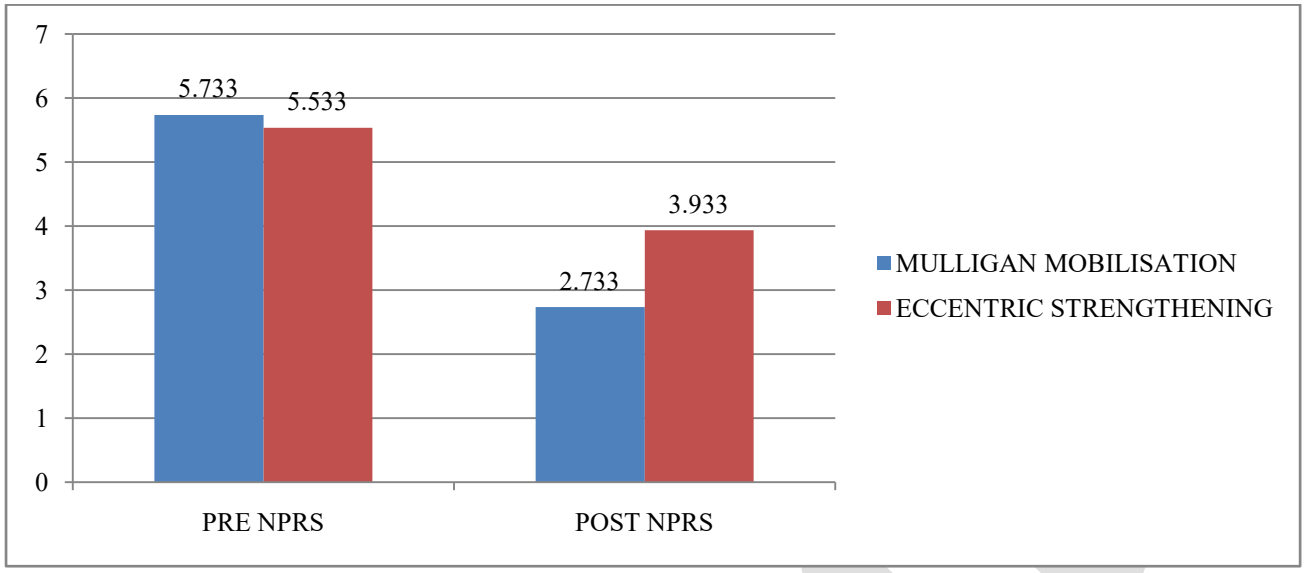


COMPAIRING OF PRE & POST NPRS READING IN GROUP A & GROUP B

TABLE NO. 2:

PRE NPRS	MEAN	STD DEV	SEM
MULLIGAN MOBILISATION	5.733	1.033	0.2667
ECCENTRIC STRENGTHENING	5.533	0.9155	0.2364
DIFFERENCE	0.2	0.3563	
95% confidence interval for difference: -0.5299 to 0.9299 : t = 0.561 with 28 degrees of freedom; P = 0.579			
POST NPRS	**MEAN**	**STD DEV**	**SEM**
MULLIGAN MOBILISATION	2.733	1.033	0.2667
ECCENTRIC STRENGTHENING	3.933	0.8837	0.2282
DIFFERENCE	-1.2	0.351	
95% confidence interval for difference: -1.919 to -0.4811 : t = -3.419 with 28 degrees of freedom; P = 0.002			

GRAPH NO.2:

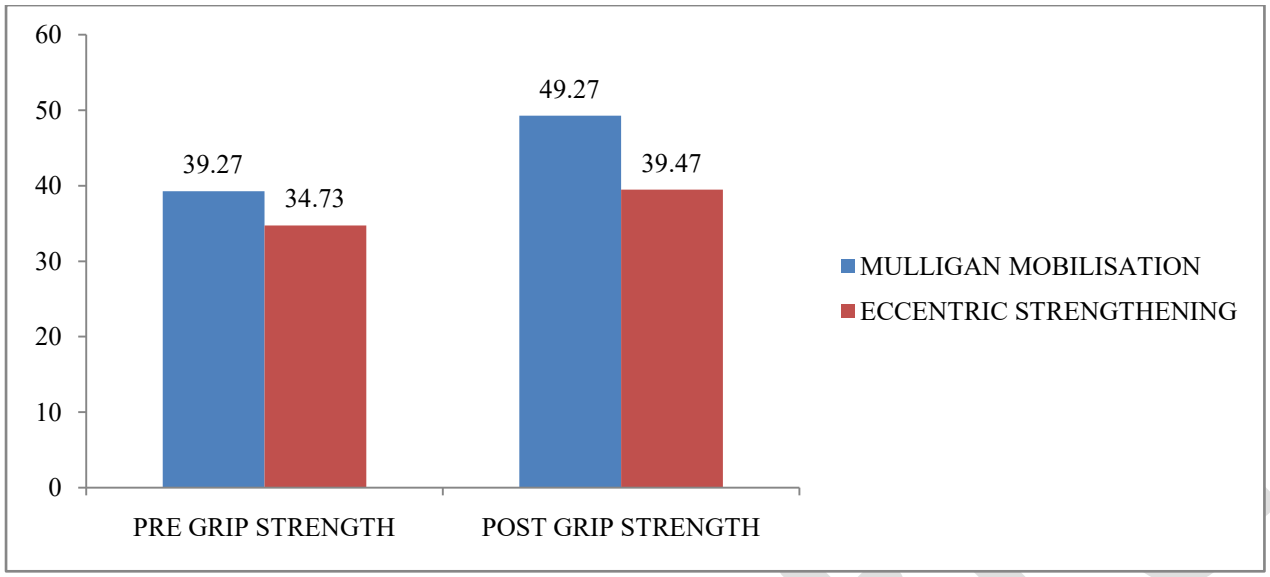


COMPAIRING OF PRE & POST GRIP STRENGTH READING IN GROUP A & GROUP B

TABLE NO. 3:

PRE GRIP STRENGTH	MEAN	STD DEV	SEM
MULLIGAN MOBILISATION	39.27	9.285	2.397
ECCENTRIC STRENGTHENING	34.73	6.123	1.581
DIFFERENCE	4.533	2.872	
95% confidence interval for difference: -1.349 to 10.42 : t = 1.579 with 28 degrees of freedom; P = 0.126			
POST GRIP STRENGTH	**MEAN**	**STD DEV**	**SEM**
MULLIGAN MOBILISATION	49.27	7.45	1.923
ECCENTRIC STRENGTHENING	39.47	6.49	1.676
DIFFERENCE	9.8	2.551	
95% confidence interval for difference: 4.574 to 15.03 : t = 3.842 with 28 degrees of freedom; P = 0.000			

GRAPH NO. 3:



RESULT

30 Subjects having tennis elbow was chosen in which 2 groups were divided. Group A was consisted patients who were given Mulligan Mobilisation & Group B consisted of patients who were given eccentric strengthening

Each group was divided into 15 subjects, each group was treated for 7 Session of interventions for 1 week everyday. In group A patients were treated by mulligan mobilisation & for group B by Eccentric strengthening.

Gender distribution was done as per mulligan mobilisation group consist of 9 males subjects and 6 female subjects, while eccentric strengthening group consists of 5 male subjects and 10 female subjects.

Age distribution was done, as per mulligan mobilisation age group under (Mean age 41.87 years) was affected and for eccentric strengthening age group under (Mean age 34.13 years) was affected.

Paired t-test was applied to compare pre & post values within the group A of NPRS (pre & post values) & grip strength (pre & post values). The group A pre test values of NPRS (Mean 5.733) and

pre test value of grip strength (Mean 39.27) and the post reading of group A on 7 day showed of NPRS (Mean 2.733) & post reading of grip strength showed of (Mean 49.27). There was (Mean Difference 3) in NRPS which was decreased in pain intensity noted by NRPS score & (Mean Difference -10) in Grip strength which was significantly increased noted by jammar hand dynamometer.

Paired t-test was applied to compare pre & post values within the group B of NPRS (pre & post values) & Grip Strength (pre & post values).The group B pre test values of NPRS (Mean 5.533) and pre test value of grip strength (Mean 34.73) and the post reading of group B on 7 day showed of NRPS (Mean 3.933) & post reading of grip strength showed of (Mean 39.47). There was (Mean Difference 1.6) in NRPS which was decreased in pain intensity noted by NRPS score & (Mean Difference -4.733) in grip Strength which was increased noted by jammar hand dynamometer.

Simple t-test was applied to compare both the groups A & B of NPRS (pre & post values). By comparing both groups, the pre reading of nprs of both groups is 5.733 & 5.533 nprs score with P = 0.579 and on post reading of both groups is 2.733 & 3.933 nprs score with P = 0.002, which gave result of decreased pain score in mulligan mobilization more over than eccentric strengthening.

Simple t-test was applied to compare both the groups A & B of Grip Strength (pre & post values).By comparing both groups, the pre reading of grip strength of both groups is 39.27 & 34.73 pounds with P=0.126 and post reading of both groups is 49.27 & 39.47 pounds with P=0.000, which gave result of increased in grip strength in mulligan mobilisation more over than eccentric strengthening.

DISCUSSION

In our study a comparison between mulligan mobilization v/s eccentric strengthening was done in patients with lateral epicondylitis. 30 samples were included in this study out of which 15 were given mulligan mobilization & 15 were given eccentric strengthening. The group which received mulligan mobilization included 9 male & 6 female, while eccentric strengthening group included 5 male & 10 female.

In a previous study conducted by Dutch medical journal practice, it was seen that lateral epicondylitis occurs mostly between the age group of 30 to 40 years and rarely occurs below 20 years. Our study also matches with their study, as the mean age of mulligan mobilization group was 41.87 years & that of eccentric strengthening group was 34.13 years. Results of our study indicate that there is significant improvement in pain & grip strength in patients with lateral epicondylitis at

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the end of one week in both groups among Mulligan Mobilisation (Group A) & Eccentric Strengthening (Group B), Mulligan Mobilisation was more effective clinically than Eccentric Strengthening in reducing pain & in improving Grip strength in patients with lateral epicondylitis. There is significant difference in intensity of pain as per NPRS & Grip Strength as per Jammar Hand Dynamometer. Studies conducted by Stephens 1995; Miller 2000, and Vicenzino and Wright 1995 also had similar results indicating that MWM was more effective in treating lateral epicondylitis..

Previous studies have found that eccentric exercises reduces the pain in patellar and Achilles tendinopathy. Isometric contractions reduces the pain in tendon disorder, increasing the strength at the angle of contraction without producing inflammatory signs therefore, it was hypothesized that simultaneous use of these contractions will further enhance the analgesic effect of contractions in the treatment of lateral epicondylitis.

Eccentric strengthening appears to reduce the pain and improve function, reversing the pathology of lateral epicondylitis. The way that eccentric training achieves the goals remains uncertain ,as there is a lack of good quality evidence to confirm that physiological effects translate into clinically meaningful outcomes and vice versa.

In our study, a short effect of eccentric strengthening was measured. These exercises may be hypothesized to be giving a better long term effect, hence further studies might involve in measuring the same.

In 1993, Mulligan's had introduced new technique for the treatment of chronic lateral epicondylitis. According to Mulligan concept, malalignment is the cause for the lateral epicondylitis. By giving mobilization with movement the normal alignment can be restored. MWM for chronic lateral epicondylalgia is capable of producing concurrent hypoalgesic effects during and following its application, as well as altering SNS function. MWM lateral epicondylitis produces a hypoalgesia and concurrent sympathoexcitation (indicated by changes in heart rate, blood pressure, and cutaneous sudomotor and vasomotor function).This could be the reason why MWM was more effective than eccentric strengthening.

The results of this study indicate that MWM is a useful technique for eliminating the pain of a previously painful active movement, in patients with lateral epicondylalgia. These results indicate that MWM may be a useful intervention modality in the rehabilitation of patients with LE. MWM resulted in a significant increase in both pain-free grip strength and maximum grip strength from pre-intervention to post-intervention for the affected limb. These results suggest that pain-free grip strength is the more responsive measure. Also since eccentric strengthening also showed

improvement, it can be also considered in reducing pain related to soft tissue conditions. In our study, a short term effects of both MWM & Eccentric strengthening was measured. However, a long term or carryover effect of both therapies were not measured which might be done in future studies.

CONCLUSION

The study concludes that the manual mobilization with movement is effective in reducing pain and increasing grip strength than that of eccentric strengthening.

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