Bulletin of Environment, Pharmacology and Life Sciences
Bull. Env. Pharmacol. Life Sci., Vol 13 [4] March 2024: 133-138

Online ISSN 2277-1808
Journal's URL: http://www.bepls.com
CODEN: BEPLAD

ORIGINAL ARTICLE **OPEN ACCESS**

Comparison Between Rotator Cuff Strengthening and Mobilization with Movement in Patients with Lateral Epicondylitis – A Randomized Clinical Trial

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ABSTRACT
To compare effectiveness of rotator cuff strengthening and Mobilization with Movement (MWM) in patients with lateral epicondylitis (LE). A Randomized Clinical Trial. 50 patients with lateral epicondylitis age from 30 to 55 years were included in the study. Patients were selected on the basis of inclusion criteria and were randomly divided into two groups. Group A received MWM with ultrasound and Group B received rotator cuff strengthening with ultrasound. The protocol is for 3 weeks, per week three sessions. The outcomes of the study were PRTEE and PFGS. Paired t test and unpaired t test were used to analyze the data. It was found that there was no significant difference at pre and post in PRTEE and PFGS between Group A and Group B. But the mean difference is slightly more in Group A but the difference is not statistically significant. This study concluded that MWM and rotator cuff strengthening are equally effective in treatment of lateral epicondylitis.
Keywords: *MWM, PFGS, PRTEE.*

Received 28.12.2023 Revised 18.02.2024 Accepted 04.03.2024

INTRODUCTION

Lateral epicondylitis is also called as 'Tennis elbow' is one of the common lesions of the elbow with reported incidence of 1-3% in general population. In general practice incidence of lateral epicondylitis (LE) is 4 -7 cases per 1000 all clinical cases [1]. In the year 1882 Morris described the disease as a 'tennis elbow' [2]. It is defined as a pain over the lateral epicondyle which is aggravated by digital palpation gripping activity and resisted middle finger extension. Dominant side arm is most commonly affected with peak age of 30 to 55 years. Cases of the lateral epicondylitis are mostly diagnosed based on the subjective history and physical examination such as a history of pain over lateral epicondyle during activities of daily living and other occupation related activities, localized or point tenderness over a common extensor origin and reduced grip strength help in diagnosis [1].Various studies have been done on pain free grip strength(PFGS) in lateral epicondylitis and found that grip strength is approximately 25% weaker in affected extremity while compared with normal [8]. It has been shown to be a sensitive and valid method for assessing clinically important change in patients with lateral epicondylitis [9]. Typically, provocative tests such as Cozens test, Mill's test and Maudsley test are used to isolate the specific tissues with pathology and to pin point the pain [1, 36].

The rotator cuff muscles have been shown to be a dynamic stabilizer of the gleno-humeral joint at multiple shoulder ranges [12]. Functional impingement of shoulder due to muscle imbalance or altered shoulder joint mechanism can impair the stabilization of shoulder [4]. Impair stabilization of shoulder which result in overcompensation of wrist extensor muscle and may lead to trauma to the soft tissue structures which are present at the lateral epicondyle. These changes in the shoulder may cause compensatory changes in the forearm and hand during repetitive movement thus causing symptoms of lateral epicondylitis [4]. It has been suggested that assessment of shoulder muscle should be important in the evaluation of individuals with lateral epicondylitis. It has been reported that there is a global weakness of the muscles of upper limb is seen that is shoulder and wrist and hand muscle strength were reduced[8]. Impairment of one or more kinetic link causes dysfunctional biomechanical output leads to pain and/or injury [13]. There is imbalance

in the activation of kinetic chain occurs in lateral epicondylitis and it may be due to protected pain related inhibition which leads to widespread muscle imbalance. So, strengthening of proximal shoulder girdle should be included in the management of lateral epicondylitis [8, 21]. Mulligan mobilization with movement (MWM) for tennis elbow is intended to cause repositioning of the 'positional fault'. Several studies and case series have found that a single application of mobilization with movement results in immediate increase in pain free grip force (strength) [14, 18]. The purpose of the present study was to find out the difference between effect of rotator cuff strengthening and mobilization with movement in patients with lateral epicondylitis. So, that most effective procedure will be added in treatment plan for the better improvement in patients with lateral epicondylitis.

MATERIAL AND METHODS

The study was approved by the Ethics Committee of MGM institute of health sciences, Navi Mumbai and was conducted at physiotherapy department at MGM School of Physiotherapy, Aurangabad. Patients were screened for inclusion and exclusion criteria and inform consent was obtained. All the patients with the following inclusion criteria were included for the study; Evidence of primary lateral elbow pain for at least 4 weeks, Age between 30 to 55 years both male and female, Positive Mills test and Pain severity 30 mm to 70 mm on 100 mm VAS. Patients were excluded if they had Elbow pain with neck movement or cervical radiculopathy, Evidence of any other secondary source of lateral elbow pain, Fracture of upper limb with residual deformity, any history of elbow surgery, Recent steroid injection, using prescription medications such as anti-inflammatory or analgesic drugs. A brief explanation of the process was given and subjects were prepared after obtaining the consent. Then the subjects were divided into two groups by using block randomization. Baseline measurements of Visual Analogue Scale (VAS), Patient Rated Tennis Elbow Evaluation (PRTEE) Questionnaire and pain free grip strength were taken. The reliability of VAS varies from 0.66 to 0.77 and validity from 0.16 to 0.51. Reliability of PRTEE is 0.89 that is it has excellent reliability. PFGS has been shown to be a sensitive and valid measurement for assessing the clinically important changes in patients with LE with reliability (test-retest ICC) is 0.87 and validity is o.47. For measuring the grip strength by using Jamar dynamometer the reliability is 0.82 and validity is 0.75. For both the groups treatment was continued for 3 weeks during that time patients had no any other treatment. All the outcome measures were taken before starting the intervention and at the end of the last session. 25 patients of group A received MWM along with conservative management that is ultrasound (pulsed ultrasound with 20% duty cycle and 3 MHz frequency at 1.3 Watt/ cm^2 intensity for 5 minutes). For MWM Lateral glide was given to the elbow and sustained by using belt and patient performed fist without pain. (3 sets of 10 bouts of MWM were given per session for 3 sessions per week for 3 weeks). 25 patients of group B received rotator cuff strengthening exercises with ultrasound. Strengthening was given using thera-tube; selection of color of thera tube was done on the basis of repetition maximum. Patients were asked to perform 10 repetitions of each exercise. The exercises were: 1. Supraspinatus: full can exercise 2. Infraspinatus and teres major: External rotation with 0^o abduction 3. Subscapularis: Internal rotation diagonal exercise.

STATISTICAL ANALYSIS

The data was in compiled in MS excel sheet. For analysis of data, SPSS 24.0 was applied. The data was represented in the forms of mean, standard deviation (SD). Both these data was represented on visual impression such as bar diagram. For intra comparison within group (pre-post values), Paired t-test was performed. For inter-comparison between 2 groups, unpaired t-test was performed.

RESULT

At baseline and after 3 weeks no significant difference was seen in PFGS and PRTEE when compared between two groups. When compared within a group significant difference was seen on PRTEE and PFGS, significantly improved by the end of 3week in both the groups with p-value ($p<0.0001$).

DISCUSSION

The present study was carried out to compare the effect of mobilization with movement of elbow and rotator cuff strengthening on PFGS and Patient Rated Tennis Elbow Evaluation Questionnaire in patients diagnosed with LE. After analyzing the outcome measures of this study result showed that there was no significant difference in mean of PFGS at post treatment and mean of PRTEE while compared between both the groups. Hence, the techniques which are used in both the groups are equally effective. But, when we saw the mean difference, there was more difference in outcome of Group A were seen, means the technique of Group A i.e. MWM is slightly superior to technique of Group B i.e. rotator cuff strengthening, But the difference is not statistically significant. In our study we compared the two treatment protocols before comparison of these protocols we proved the effectiveness of each protocol individually. The treatment protocol for group A was MWM along with ultrasound. The mean difference of PFGS and PRTEE at pre

versus post treatment in Group A was found 8.82 Kg and 29.86 respectively, which shows that there was significant improvement was seen in PFGS and PRTEE after the application of MWM technique ($p< 0.0001$). This is in agreement with previous study done by Kochar and Dogra in the year 2002 suggesting that the addition of Mulligan mobilization with movement technique with ultrasound compared with ultrasound alone leads to better improvement in outcome i.e.97% improvement in pain and positive gain in muscle strength [6, 11-14]. Furthermore the results are also in consistent with those of Akram Amro who conducted a study in the year 2010 to see the effect of combination of Mulligan technique with traditional treatment with taping and traditional treatment alone. This study result showed that combination of Mulligan technique with traditional treatment leads to better outcome in patients with LE [22]. Our study results showed that there was slightly more difference occurred in outcomes in Group A. our results are thus, in agreement with the findings of J.H.Abbott who found a significant increase in pain free grip strength after MWM treatment. In addition to these studies Namrata Patel in 2015 compared the effect of MWM with wrist manipulation suggesting that MWM causes more improvement in pain and functional status than wrist manipulation. As most of the cases pain is the main factor which limits the activities or functional performance in patients of LE. By reducing the intensity of pain, MWM also helps to improve the ability to perform daily functional activities [17]. According to the Brian Mulligan's concept the pain in patients of tennis elbow will disappear after the treatment with elbow joint mobilization, and this might be the reason behind the positive results which we got in our study. Further, he suggested that following injury or strain minor positional faults occurs. Positional faults are noting but the minor faults which are not palpable or visible on x-rays. But, when correctional mobilization is applied, pain free function is restored and further several repetitions bring more improvement. The reason mulligan gave to confirm the hypothesis is that while applying the mobilization it is always at right angles to the plane of movement and will work in only one direction [6]. MWM technique is help to restore normal tracking of radius on the capitulum, due to this strengthening of forearm musculature can be possible with less pain or without pain which leads to pain free grip strength and pain free activities which were painful prior. Application of MWM will cause local change in bones and soft tissues and neural receptors in soft tissues which might be the cause of result which we obtained [18-31]. Result of our study also showed that in group B which was treated with rotator cuff strengthening along with ultrasound also showed significant improvement in outcomes. The mean difference of PFGS and PRTEE while comparing pre and post intervention were 7.12 kg and 28.50 respectively. Which shows that there was significant improvement in the score of PRTEE and PFGS ($p< 0.0001$). Our results were in agreement with the study done by Charu Eapen in the year 2015, he performed a Randomized Clinical Trial to see the effect of addition of rotator cuff strengthening exercises with ultrasound and eccentric wrist extensor exercise. From the study he suggested that addition of rotator cuff strengthening significantly improved pain free grip strength in patients with lateral epicondylitis which was not seen in another group [1-4, 32-36].

The reason of improved PFGS might be the reduction in pain and increased strength. From the previous studies it has been investigated that proximal musculature strengthening plays a role in grip strength and use of hand- grip dynamometer is valid tool for assessing the upper extremity strength impairment. Adding rotator cuff strengthening exercise cause improved the imbalance in kinematics of shoulder leads to reduced overuse of elbow and improvement in PFGS [4, 28, 20]. After looking each protocol individually, we compared the both protocol and group A and group B both the groups showed improvement in PRTEE and PFGS when compared pre and post measures. But after comparison between both the groups there was no significant difference at post treatment in PFGS and PRTEE was noted. But when we saw the mean difference, differences in outcomes were slightly more in group A. So, this study describes that techniques of both the groups i.e. MWM and rotator cuff strengthening were equally effective but, MWM is slightly superior to rotator cuff strengthening but the difference is statistically not significant.

Further research can be done to see the long-term effect of addition of MWM and rotator cuff strengthening in management of LE. These two techniques can be compared with another physiotherapy intervention to see the effect on lateral epicondylitis.

LIMITATIONS

1. The study duration is short due to time constrained.
2. Long term follow up was not carried out so, we don't know the long-term effect of both the interventions.

CLINICAL IMPLICATION

As no participants in either group reported adverse effects/ discomfort with the interventions. And both the interventions showed significant improvement when compared pre and post treatment hence both the interventions are equally effective and can be use in the treatment of LE to delay or prevent the need of

surgical intervention. This study explains the importance of assessment and management of rotator cuff strength in LE cases as this aspect is underestimated in clinical practice.

CONCLUSION

From the study it has been concluded that both the techniques i.e. Mobilization with Movement and rotator cuff strengthening are equally effective in improving pain free grip strength and score of patient rated tennis elbow evaluation questionnaire in patients with lateral epicondylitis.

IMAGE NO1: MOBILIZATION WITH MOVEMENT

IMAGE NO 2: INFRASPINATUS AND TERES MAJOR

IMAGE NO 3: FULL CAN EXERCISE STRENGTHENING

Table 1: Comparison of Mean of PFGS in kg in pre & post treatment of patients in Groups: (Unpaired t-test)

PFGS in kg	Group A Mean ± SD	Group B Mean ± SD	t-value	P-value
Pre-treatment	12.60± 7.73	12.88 ± 6.01	0.143	P=0.887NS
Post-treatment	21.42± 8.56	20.00 ± 8.37	0.593	P=0.556 NS

Table 2: Comparison of Mean of PRTEE in pre & post treatment of patients in Groups: (Unpaired t-test)

PRTEE	Group A Mean ± SD	Group B Mean ± SD	t-value	P-value
Pre-treatment	**52.84± 8.77**	**50.42 ± 7.18**	**1.07**	**P=0.291 NS**
Post-treatment	**22.98± 9.74**	**21.91 ± 9.03**	**0.402**	**P=0.691 NS**

ACKNOWLEDGEMENT

I humbly and my whole heartedly dedicate this work to almighty who blessed me with opportunity that was to work upon this study. I am grateful to my parents without whose encouragement and blessings I would have not reached this present educational level. A thesis of this scope and depth could not have been possible without the efforts of countless individuals. I am most grateful and want to express my deep sense of gratitude to Dr. Sanket S. Mungikar M.P.T (Musculoskeletal). Assistance professor MGM's College of Physiotherapy, Aurangabad and my guide, who stands to be the bedrock of my thesis. I am indebted to him for his valuable guidance and source of inspiration throughout the work and making it a pragmatic work.

FUNDING: Funding was not provided.

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CITATION OF THIS ARTICLE

Pratiksha P. J, Sanket S. Mungikar, Snehal S. Khalegaonkar. Comparison Between Rotator Cuff Strengthening and Mobilization with Movement in Patients with Lateral Epicondylitis – A Randomized Clinical Trial. Bull. Env.Pharmacol. Life Sci., Vol 13 [4] March 2024: 133-138