

## EFFECTS OF MOBILIZATION WITH MOVEMENT VERSUS MILLS MANIPULATION TECHNIQUE IN CHRONIC LATERAL EPICONDYLITIS

Asma Aleem<sup>1</sup>, Syed Shakil ur Rehman<sup>2</sup>, Raheela Kousar<sup>3</sup>, Suffian Khalid<sup>4</sup>, Syble Chiragh<sup>5</sup>

### Authors' Affiliation

<sup>1</sup> Department of Physical Therapy, Khaldunia Institute of Technology and Applied Sciences Lahore

<sup>2</sup> Department of Physical Therapy, Riphah International University Lahore

<sup>3</sup> Department of Physical Therapy, The University of Chenab Gujrat

<sup>4</sup> Department of Physical Therapy, Ghurki Trust and Teaching Hospital Lahore

<sup>5</sup> Department of Physical Therapy, National Hospital and Medical Centre Lahore

### Corresponding Author

Dr. Asma Aleem PT  
Lecturer and Program Coordinator, Department of Physical Therapy, Khaldunia Institute of Technology and Applied Sciences Lahore  
Email: [asmaaleem26@gmail.com](mailto:asmaaleem26@gmail.com)

### ABSTRACT

**Objective:** To determine the effects of Mobilization with Movement and Mill's Manipulation on functional activities, range of motion (ROM) and reducing pain in patients with tennis elbow.

**Material & Methods:** Single blinded Randomized control trial was conducted at Bajwa Hospital Lahore. Consecutive sampling was utilized to enter the Subjects in the study, while Lottery Method was done to assign Treatment groups. The sample consisting of 54 participants was further allocated into two groups. Mobilization with movement technique with baseline treatment was applied in Group A and Mill's Manipulation technique with corresponding baseline treatment was applied in Group B for 4 weeks. The assessment tools included patient related tennis elbow evaluation questionnaire, Numeric pain rating scale and Universal Goniometer. Data was analyzed by SPSS version 21.

**Results:** The result showed that there is significant improvement in group A mean difference of pain is 2.52, Patient related tennis elbow evaluation questionnaire is 65.9, flexion having 23.52, extension 40.14, ulnar deviation 16.19 and radial deviation having 10.0, on the other hand group B having mean difference of pain is 1.88, Patient related tennis elbow evaluation questionnaire 13.37, Flex having 6.41, extension 28.04, ulnar deviation 9.96 and radial deviation is 7.22 with p-value < 0.01.

**Conclusion:** It is concluded that if patient with tennis elbow treated with mobilization with movement technique was demonstrate more improve result in pain, ROM and function then treated with mill's manipulation technique.

**Key Words:** Elbow, Epicondylitis, Mobilization, Manipulation, Pain.

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### INTRODUCTION

Any pathology, injury, incidence occur in the human body include muscle, joints, tendon ligaments are known as musculoskeletal disorder. Now a day's prevalence of MSK disorder increasing day by day. 1/10,000 person might not suffer from back pain once in a lifetime. Otherwise, every person, once suffers from musculoskeletal disorder once in their life. Sign and symptoms include pain, stiffens, swelling and

weakness, numbness. Low back pain, neck pain, rheumatoid arthritis, sprain and strain injuries, lateral epicondylitis, fasciitis, and tendinitis they all include in musculoskeletal disorder.<sup>1</sup>

There is a variety of option available for dealing the patient suffering from musculoskeletal disorder. Like hot pack, cryotherapy, tens, stimulation, NSAIDS, injection and in the end surgery. Treatment protocol varies from individual to individual, pathology variation, availability of facilitation.<sup>2</sup> In non-traumatic

elbow pathologies most commonly, pain occurred at lateral side of elbow. Lateral elbow pain is called lateral epicondylitis which is also known as tennis elbow. Moreover in some pathologies/conditions lateral epicondylitis also mimic as intra-articular plica, radiocapitellat arthritis, osteochondritis dissecans or posterolateral rotatory instability.<sup>3</sup>

Epidemiology it has been revealed that approximately 1-3% adult suffer from tennis elbow annually. However initial, management is based on non-surgical treatment.<sup>4</sup> In 1873 Dr. F. Runge a German first named it as ‘‘Epicondylitis humeri radialis’’, while in 1883 in the British Journal of Sports Medicine they changed its name and called it as ‘‘Tennis elbow’’. It’s the characteristic of LE that chronic degeneration occur at origin side of extensor carpi radialis brevis muscle on the lateral epicondyle of the humerus. Its sign and symptoms include weakness, pain and stiffness at lateral aspect of elbow and its mostly occur due to repetition and overuse of activity. Approximately it occur 1-3% in population annually.<sup>5</sup>

Tennis elbow more frequently influences recreational players than professional ones, while young tennis players mostly hit with their ball strike while keeping the wrist in flexed position. On the other hand, professional tennis player kept their wrist in more extension position before the ball strike.<sup>6</sup> Goal of this research determine the effects of Mobilization with Movement (MWM) and Mill’s Manipulation on functional activities, ROM and reducing pain in patients with tennis elbow. Tennis elbow interferes with the daily activity of living and is also a major cause of disability so an established treatment protocol may eliminate discomfort and pain among patients.

## **MATERIAL AND METHODS**

Single blinded (assessor blind) Randomized clinical trial was performed at Physical Therapy department, Bajwa hospital Lahore, Pakistan from October 2019 to April 2020, with parallel design in which participants were equally allotted into two groups with one being experimental group and other being control group. The RCT was prospectively registered with the Iranian Registry of Clinical Trial Number

IRCT20200921048792N1. Consent was obtained from participants after receiving approval form from Institutional Review Board of Riphah International University Lahore. Total sample size are 54 patients (27 in each group with confidence level 0.95 and power is 0.8 and Ratio of sample sizes ( $n_2/n_1$ ) 1, Tails 2. Sample size was calculated by Epi Tools.<sup>7</sup>

In the eligibility process a total of 60 patients attending the physical therapy department at Bajwa Hospital Lahore were screened. Out of the total 60 patients, 54 patients fulfilling the eligibility criteria were selected. The sample consisting of these 54 participants was then further allocated into two groups. Consecutive sampling was utilized to enter the participants in the research, while Lottery Method was done to assign Treatment groups. Inclusion Criteria of this study was Participants having an age between 20 – 40 years, Both males and females. Any member introducing to the hospital with local pain and tenderness on the lateral side of the elbow, positive pain provocation tests and Mill’s maneuvers.<sup>8</sup> Gradual onset of symptoms presents for six months without any set injury to the elbow joint. Exclusion criteria included patients with comorbidities such as neuromuscular disease or any such condition that is contraindicated in manual therapy, patients not being able to return for follow up and patients receiving other treatments in addition to this research were also excluded from the study.

Before enrolling patients in groups take account into above-mentioned inclusion and exclusion criteria. All the detail was explained to patients regarding treatment session before allocating them in a group, taken them in confidence and guaranteed were given to them that their data were kept confidential. Written informed consent was taken. Each participant was asked to draw a coupon having either number one or number two printed on it. Participants having picked up number one were assigned to Group A that was MWM. While those having picked up number two were assigned to Group B that was Mills manipulation.

Intervention of the study was Subjects of group A were subjected to mobilization with movement technique. The technique involves the application of lateral glide to the proximal forearm laterally while the other hands to glide the distal end of the

humerus. The glide was sustained over a period of 5 to 10 seconds while the participants performing the pain free gripping action. In total 6 repetition were done during a single session of treatment. A gap of no longer than 60 session was present while performing the repetitions. The technique was performed over a period of 4 weeks in a manner of 2 session/week. The crucial rule of the technique not evoking pain was followed.

The Subjects of group B were subjected to Mills Manipulation technique. The therapist was present behind the seated patients. Affected extremity kept in 90-degree abduction with internal rotation sufficient in order that the olecranon became faced up. The wrist of participants was stabilized in full flexion and pronation by the therapist, with the aid of one hand while opposite hand being positioned over the olecranon. Even as total wrist flexion and pronation became maintained, a high velocity and low amplitude thrust at the end range of elbow extension was given by therapist. This technique was applied in 2 sessions/week for 4 weeks. Ultrasound therapy for 10 minutes intermittent mode with 3MHZ frequency was applied as baseline treatment in both groups.

For the measurement of outcome Numeric pain rating scale was used for the assessment of pain. NPRS is valid and reliable scale to measure pain intensity. The 11-point numeric pain rating scale from '0' representing one pain extreme to '10' representing the other pain extreme.<sup>9,10</sup>

Universal Goniometer was used for measuring joint range of motion.<sup>11</sup> Functional activity measured by patient related tennis elbow evaluation questionnaire. Questionnaire is valid and reliable for analyzing the patients of lateral epicondylitis.<sup>12</sup> SPSS software version 21 was used to analyze and managed the data. Statistical significance  $\alpha$  was set at 5%. A Frequency table, pie charts, bar charts become used to reveal summary of group measurements measured over time. Independent sample t test, Man Whitney u test (non-parametric data) were used between groups. Paired sample t-test (parametric), wilcoxon sign test (non-parametric) was used within groups.

## RESULTS

The results showed that there is significant improvement in group A mean difference of pain is 2.52, Patient related tennis elbow evaluation questionnaire is 65.9, flexion having 23.52, extension 40.14, ulnar deviation 16.19 and radial deviation having 10.0, on the other hand group B having mean difference of pain is 1.88, Patient related tennis elbow evaluation questionnaire 13.37, Flex having 6.41, extension 28.04, ulnar deviation 9.96 and radial deviation is 7.22 with p-value < 0.01. Means and standard deviation of ages in both groups revealed that subject in group A MWM and group B having  $30.48 \pm 2.966$  mean and standard deviation. MWM there were 13 males and 14 females, while in MILLS there were 12 males and 15 females enrolled in the study.

Group A (MWM) showed mean after treatment for NPRS was 5.89, flexion 76.52, extension 69.78, Ulnar deviation 33.89, and Radial deviation was 22.11, while in group B (MILLS) mean value before treatment for NPRS was 6.56, grip strength 27.948, flexion 65.15, extension 56.67, Ulnar deviation 28.07, Radial deviation was 18.85. For NPRS, flexion, extension, Ulnar deviation, Radial deviation the outcomes revealed that there was remarkable variation in the mean value between two groups. But having a p-value 0.000 for all above-mentioned variables. As  $p < 0.001$  Both groups were effective in treating the patient of tennis elbow, but MWM seems more effective as compared to MILLS. After three weeks group A showed mean value was 49.26 and group B showed mean value was 57.95. As p-value < 0.01 so MWM is more effective as compared to MILLS. (**Table 1**)

Group A (MWM) showed mean and standard deviation before treatment of NPRS was  $8.41 \pm 0.572$ , extension  $29.63 \pm 8.567$ , flexion  $53.00 \pm 9.004$ , ulnar deviation  $17.70 \pm 5.045$  and radial deviation  $12.11 \pm 2.592$ . After three weeks session it showed that mean and standard deviation of NPRS was  $5.89 \pm 0.801$ , extension  $69.78 \pm 6.841$ , flexion  $76.52 \pm 5.184$ , U.D  $33.89 \pm 3.620$  and R.D  $22.11 \pm 2.118$ . For NPRS, extension, flexion, U.D and R.D the outcomes show that remarkable variation pre and post treatment score as p-value is < 0.01. (**Table 2**) Group B (MILLS), showed mean and standard deviation before treatment of NPRS was  $8.44 \pm 0.572$ , extension  $28.63 \pm 9.274$ , flexion

58.74±1.347, ulnar deviation 18.11±4.577 and radial deviation 11.63±2.186. After three weeks session it showed that mean and standard deviation of NPRS was 6.56±0.801, extension 56.67±7.437, flexion 65.15±6.011, U.D 28.07±3.149 and R.D 18.85±1.634. For NPRS,

extension, flexion, U.D and R.D the outcomes show that remarkable variation pre and post treatment score as p-value is <0.01. (Table 3)

**Table 1: Between group comparison**

	Mean value Group A (MWM)	Mean value Group B (MILLS)	Group A SD	Group B SD	Mean Rank Group A	Mean Rank Group B	Standard Error mean A	Standard Error mean B	P value
NPRS	5.89	6.56	0.801	0.801	21.94	33.06	-	-	<0.01*
Flexion	76.52	65.15	5.184	6.011	38.96	16.04	-	-	<0.01*
Extension	69.78	56.67	6.841	7.437	38.22	16.78	-	-	<0.01*
Ulnar Deviation	33.89	28.07	3.620	3.149	38.04	16.96	-	-	<0.01*
Radial Deviation	22.11	18.85	2.118	1.634	37.98	17.02	-	-	<0.01*
PRTEEQ	49.26	57.59	5.997	4.676	-	-	1.154	.900	<0.01 <sup>§</sup>

PRTEEQ: Patient Related Tennis Elbow Evaluation Questionnaire  
\*Mann-Whitney U test    § Independent Sample T Test

**Table 2: Withing group comparison**

MWM group A	Mean± stand dev. Pre-treatment	Mean± stand dev. treatment	Post Mean Difference	Mean Rank	P-value
<b>Mobilization With Movement Group</b>					
NPRS	8.41±0.572	5.89±0.801	2.52±0.229	14.00 (post) .00 (pre)	<0.01
Extension	29.63±8.567	69.78±6.841	40.15±1.726	.00 (post) 14.00 (pre)	<0.01
Ulnar deviation	17.70±5.045	33.89±3.620	16.19±1.425	.00 (post) 14.00 (pre)	<0.01
Radial deviation	12.11±2.592	22.11±2.118	10.0±0.474	.00 (post) 14.00 (pre)	<0.01
Flexion	53.00±9.004	76.52±5.184	23.52±3.82	.00 (post) 14.00 (pre)	<0.01
<b>Mills Manipulation Group</b>					
NPRS	8.44±0.572	6.56±0.801	1.88±0.229	14.00 (post) .00 (pre)	<0.01
Extension	28.63±9.274	56.67±7.437	28.04±1.837	.00 (post) 14.00 (pre)	<0.01
Ulnar deviation	18.11±4.577	28.07±3.149	9.96±1.428	.00 (post) 14.00 (pre)	<0.01
Radial deviation	11.63±2.186	18.85±1.634	7.22±0.552	.00 (post) 14.00 (pre)	<0.01
Flexion	58.74±1.347	65.15±6.011	6.41±4.664	.00 (post) 14.00 (pre)	<0.01

## DISCUSSION

Lateral epicondylitis is a pathology which is also called tennis elbow, mostly occur in tennis player. Inflammation occurs at lateral epicondyle due to repetition of activity and keeping wrist in extension with forearm aggressive movement. Patient complaint that they are suffering from pain, weakness, and restriction of the activity of daily livings.<sup>4</sup> This study aim was to accomplish the comparison of mulligan mobilization with movement and mills manipulation to access its effectiveness in tennis elbow patient with chronic pain. As there is limitation of evidence of these techniques in lateral epicondylitis patients.

In the current study both techniques were used as an intervention to manage the patient of lateral epicondylitis with chronic pain. A total 54 patients of tennis elbow with chronic pain were randomly assigned into two groups. In group A MWM was applied while in group b MILLS was applied. Parameter was assessed before and after three weeks of treatment which consist of total 9 sessions. Bhardwaj, Pooja; Dhawan, Amit worked, aimed of the research were to analyze the effect of MWM and Cyriax in tennis elbow. It was a randomized control trial study. And 60 subjects were enrolled in a study, participants were arbitrarily divided into 3 Batches. One treated with MWM and ultrasound, second with Cyriax and ultrasound while third treated with ultrasound. VAS and PRTEEQ was used as parameter for assessing pain and grip strength and ADI's. Paired and unpaired t test, HOC test and one-way ANOVA test was applied on it. For descriptive statistics means and standard deviation was used. Result shows that MWM reduce pain and gain grip strength more significantly as compared to Cyriax. And they conclude in their study that group, group 1 and 2 show significant result but MWM show more significant result as compared to Cyriax.<sup>13</sup>

Above study support our study result, in group 1 mean difference of pain is 2.52, PRTEEQ is 65.9, flexion having 23.52, extension 40.14, ulnar deviation 16.19 and radial deviation having 10.0, on the other hand group 2 having mean difference of pain is 1.88, PRTEEQ 13.37, Flex having 6.41, extension 28.04, ulnar deviation 9.96 and radial deviation is 7.22 with p-value <0.01. Which shows that both groups are significantly effective in reducing pain and gaining ROM and strength while MWM shows more clinical and statically and significant result as compared to Mills manipulation.

Another study also supports our study result and conclusion Laurentius Jongsoon Kim and their colleague purposed in their study was to analyses the effect of MWM for treating tennis elbow. The study design was RCT. Sample size consists on 10

patients. In and these patients were randomly allocated into 2 groups each having 5 patients. Group 1 was Experimental group and received MWM and therapeutic intervention while group 2 was control group and just received therapeutic intervention. Therapeutic intervention includes hot pack, TFM, ultrasound and TENS. Pain and functional ability were assessed through VAS and PRTEEQ. Treatment duration last for 10 days on alternative basis. Result exposed that statistically and clinically more significant difference was found in experimental group. And they conclude that MWM is more effective for reducing pain and improving functional abilities as compared to therapeutic intervention.<sup>14</sup>

Pooja Ghosh Dasm study was a randomized control trial. Purpose of this research was to determine the effect of cyriax approach which include Mills manipulation with transverse deep friction massage and mulligan mobilization which account MWM technique. Total 31 patients were inducted in the study, group A provided with cyriax approach with baseline treatment, while group B with MWM approach. Pre and post measurement were observed for pain and functional activity. VAS and DASH were used as a parameter for pain functional abilities assessment. Their result shows that there was statistically significant difference for pain and grip strength before and after treatment (p-value<0.05), while there were no statistical significance showed between the group (p-value>0.05). So they conclude that both techniques were equally significant for reducing pain and improving activity, but MWM was more effective as compared to mills manipulation<sup>15</sup>.

Above study doesn't support our result, as their p-value was >0.05 and they conclude that Mills and MWM show equivalent result to reduce pain, and increasing functional activity, while our study results shows that p<0.01 which conclude that MWM is more effective in reducing pain and decreasing disability as compared to Mills.

## CONCLUSION

This study concluded that both techniques was effective in reducing pain, increasing range of motion and reducing the difficulty faces by an individual for doing ADL's but MWM show remarkable result as compared to MILLS Technique.

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