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*Original Article*

# Comparison of Mulligan Mobilization with Movement and Progressive Strengthening Exercises in Patient with Lateral Epicondylitis

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## ABSTRACT

Background: Lateral epicondylitis, commonly known as tennis elbow, is the most prevalent cause of elbow pain. Both Mulligan Mobilization with Movement (MWM) and Progressive Resistive Exercises (PRE) have shown effectiveness in treating lateral epicondylitis individually. This study aims to compare the effects of these two interventions to determine which is more effective in managing lateral epicondylitis.

Objective: To compare the effects of Mulligan Mobilization with Movement and Progressive Resistive Exercises in relieving pain, improving functional disability, and enhancing pain-free grip strength in patients with lateral epicondylitis.

Methods: A randomized clinical trial was conducted on 33 patients with symptomatic tennis elbow from July 2020 to January 2021 at the Bone and Joint Center and Khyaban Medical Center. Participants were randomly assigned to Group A (n=16) receiving Mulligan Mobilization with Movement and conventional physiotherapy, and Group B (n=17) receiving Progressive Resistive Exercises and conventional therapy. Patients were assessed using the Visual Analogue Scale (VAS), Patient-Rated Tennis Elbow Evaluation (PRTEE), and hand dynamometer to measure pain intensity, functional status, and grip strength at baseline, after 5 sessions, 10 sessions, and at a 6-week follow-up. Data were analyzed using SPSS version 25.

Results: Both groups showed significant improvements within group analyses. Group A showed a more substantial reduction in VAS scores and PRTEE scores, with median VAS scores decreasing from 7 to 2 ($p=0.001$) and PRTEE scores improving from 41 to 8 ($p=0.001$). Group B demonstrated greater improvements in pain-free grip strength, with median values increasing significantly at all time points ($p<0.05$). Between-group analysis revealed that Group A had more significant improvements in VAS and PRTEE scores, while Group B had more significant improvements in pain-free grip strength.

Conclusion: Mulligan Mobilization with Movement was more effective in reducing pain and improving functional status in patients with lateral epicondylitis compared to Progressive Resistive Exercises. However, Progressive Resistive Exercises were more effective in enhancing pain-free grip strength. These findings suggest the importance of tailored treatment approaches based on individual patient needs.

Keywords: Lateral epicondylitis, tennis elbow, Mulligan Mobilization with Movement, Progressive Resistive Exercises.

## INTRODUCTION

Lateral epicondylitis, commonly known as tennis elbow, is a prevalent cause of elbow pain, primarily affecting individuals engaged in repetitive wrist extension and forearm supination activities. The elbow's anatomical complexity, composed of three bones forming the joint, and its rich muscular and ligamentous support contribute to its stability and functional versatility. However, this same anatomical complexity makes the elbow susceptible to overuse injuries, particularly at the epicondyles (1). Epicondylitis, characterized by inflammation or swelling of the elbow epicondyles, is a condition frequently observed in athletes such as tennis

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and badminton players, as well as in manual laborers, musicians, and computer users who engage in repetitive wrist or hand extension movements (2-4). The condition, more common in the lateral aspect of the elbow, affects approximately 1-3% of the general population and is more prevalent than its medial counterpart, golfer's elbow (5).

The pathophysiology of lateral epicondylitis involves degeneration of the extensor carpi radialis tendon, leading to ischemia and oxygen deprivation. This degeneration is often seen in chronic cases, resulting in muscle atrophy and reduced functional capacity (6, 7). While various treatment modalities exist, including rest, physiotherapy, and surgical interventions, recent studies have focused on non-invasive techniques such as Mulligan Mobilization with Movement (MWM) and Progressive Strengthening Exercises (8). These modalities aim to alleviate pain, improve functional ability, and enhance pain-free grip strength, crucial for patients' quality of life and daily activities.

Mulligan Mobilization with Movement (MWM) is a manual therapy technique that combines passive mobilization with active patient movement, intended to correct positional faults and restore pain-free function (9). This approach has been shown to significantly reduce pain and improve functional outcomes in patients with lateral epicondylitis (10). Progressive Strengthening Exercises, on the other hand, focus on gradually increasing the load on the affected muscles to enhance strength and endurance, thereby reducing pain and improving functional status (11). Both modalities have demonstrated effectiveness in clinical settings, but a comparative analysis to determine the superior approach is warranted.

In this study, we conducted a randomized clinical trial to compare the effects of MWM and Progressive Strengthening Exercises in patients with lateral epicondylitis. Participants were randomly assigned to two groups: Group A received MWM along with conventional physiotherapy, while Group B underwent Progressive Resistive Exercises combined with conventional therapy. The intervention spanned five days per week for two weeks, with outcomes assessed at baseline, after five and ten sessions, and at a six-week follow-up. Pain intensity, functional status, and grip strength were measured using the Visual Analogue Scale (VAS), Patient-Rated Tennis Elbow Evaluation (PRTEE), and hand dynamometer, respectively(18-20).

The results revealed significant improvements in both groups across all measured outcomes. Group A showed more substantial improvements in VAS and PRTEE scores, indicating greater pain relief and functional enhancement. Conversely, Group B exhibited more significant gains in pain-free grip strength, highlighting the efficacy of Progressive Strengthening Exercises in this regard. These findings are consistent with previous research, suggesting that both MWM and Progressive Strengthening Exercises are effective for treating lateral epicondylitis, but each has specific strengths (10-13).

In conclusion, while both treatment modalities are beneficial, MWM appears to be more effective in reducing pain and improving functional disability, whereas Progressive Strengthening Exercises excel in enhancing grip strength(14-15). This study underscores the importance of tailored treatment approaches based on individual patient needs and highlights the potential for combining these modalities to optimize clinical outcomes in patients with lateral epicondylitis.

## MATERIAL AND METHODS

A randomized clinical trial was conducted at the Bone and Joint Center and Khyaban Medical Center in Rawalpindi from July 2020 to January 2021, following approval from the Board of Advanced Studies and Research (BASR). The study adhered to the ethical principles outlined in the Declaration of Helsinki. Purposive sampling with group randomization via a sealed envelope method was utilized. The study included patients aged 20 to 40 years, of both genders, who had been clinically diagnosed with lateral epicondylitis for at least three months. Inclusion criteria required patients to exhibit local tenderness over the lateral epicondyle and positive results on Mills or Cozen tests (8, 9). Exclusion criteria encompassed traumatic injuries, grade 3 ligament or tendon tears, recent elbow surgeries, systemic diseases, and neurological conditions such as stroke, multiple sclerosis, or cerebrovascular accidents.

Eligible participants provided informed consent before being randomly allocated into two groups: Group A and Group B. Group A received Mulligan Mobilization with Movement (MWM) alongside conventional therapy, which included deep transverse friction massage, therapeutic ultrasound, and muscle stretching. Group B underwent Progressive Resistive Exercises (PRE) in conjunction with conventional therapy, comprising ultrasound, deep transverse friction massage, and stretching exercises. Each group received treatment five days a week for two weeks. Outcome measures were evaluated at baseline, after five sessions, after ten sessions, and at a six-week follow-up.

Pain intensity was measured using the Visual Analogue Scale (VAS), functional status was assessed with the Patient-Rated Tennis Elbow Evaluation (PRTEE), and grip strength was evaluated using a hand dynamometer. The study involved a total of 33 participants, with 16 in Group A and 17 in Group B. The mean age of participants was 26.67±4.628 years, with Group A having a mean age of 26.33±4.765 years and Group B having a mean age of 26.82±4.362 years. There were 5 females and 11 males in Group A, and 5 females and 12 males in Group B.

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Data collection involved baseline assessments and follow-up evaluations at specified intervals. Data were analyzed using SPSS version 25. Descriptive statistics were calculated for demographic variables. Within-group and between-group comparisons were conducted using appropriate parametric and non-parametric tests to assess changes in VAS, PRTEE, and grip strength. The Mann-Whitney U test was used for between-group comparisons of non-normally distributed data, and the significance level was set at $p<0.05$.

The analysis revealed significant improvements in both groups across all outcome measures. Within-group analysis showed that both MWM and PRE were effective in reducing VAS scores, improving PRTEE scores, and enhancing pain-free grip strength. Between-group analysis indicated that MWM was more effective in alleviating pain and improving functional status, while PRE showed greater efficacy in increasing grip strength.

This study concluded that both Mulligan Mobilization with Movement and Progressive Resistive Exercises are beneficial in treating lateral epicondylitis, with each modality offering specific advantages. The findings support the tailored application of these interventions based on individual patient needs to achieve optimal therapeutic outcomes.

## RESULTS

The study included 33 participants who completed the intervention period. The mean age of the participants was 26.67 ± 4.628 years. Group A had a mean age of 26.33 ± 4.765 years, and Group B had a mean age of 26.82 ± 4.362 years. Gender distribution in Group A was 5 females and 11 males, while Group B had 5 females and 12 males.

Table 1: Demographic Characteristics of Participants

| Group | Gender | Frequency | Mean ± SD (Age) |
|---|---|---|---|
| A | Females | 5 | 26.33 ± 4.765 |
| | Males | 11 | |
| B | Females | 5 | 26.82 ± 4.362 |
| | Males | 12 | |

Visual Analogue Scale (VAS)

Both groups demonstrated significant improvements in VAS scores from baseline to the end of the study period. Group A showed more substantial improvement compared to Group B.

Table 2: VAS Scores Within Group Analysis

| Group | Baseline Median (IQR) | 5 Sessions Median (IQR) | 10 Sessions Median (IQR) | 6 Weeks Median (IQR) | P-value |
|---|---|---|---|---|---|
| A | 7 (1) | 6 (1) | 4 (1) | 2 (1) | 0.001 |
| B | 7 (1) | 6 (1) | 4 (1) | 2 (1) | 0.001 |

PRTEE (Patient-Rated Tennis Elbow Evaluation)

Both groups also showed significant improvements in PRTEE scores, indicating enhanced functional status. Group A demonstrated more significant improvement in PRTEE scores compared to Group B.

Table 3: PRTEE Scores Within Group Analysis

| Group | Baseline Median (IQR) | 5 Sessions Median (IQR) | 10 Sessions Median (IQR) | 6 Weeks Median (IQR) | P-value |
|---|---|---|---|---|---|
| A | 41 (12) | 37 (16) | 20 (16) | 8 (1) | 0.001 |
| B | 42 (12) | 35 (13) | 25 (9) | 15 (7) | 0.001 |

Pain-Free Grip Strength

Pain-free grip strength improved significantly in both groups, with Group B showing more substantial improvements compared to Group A.

Table 4: Pain-Free Grip Strength Between Group Analysis

| Session | Group A Mean Rank | Group B Mean Rank | Median (IQR) | P-value |
|---|---|---|---|---|
| Baseline | 12.63 | 15.06 | 6.00 (2) | 0.005 |
| 5 Sessions | 13.09 | 17.50 | 9.00 (2) | 0.014 |
| 10 Sessions | 14.54 | 19.02 | 12.00 (2) | 0.026 |
| 6 Weeks | 16.75 | 21.0 | 14.00 (2) | 0.023 |

Summary of Results

Within-group analysis showed significant improvements in VAS, PRTEE, and pain-free grip strength in both groups. Between-group analysis indicated that Group A (MWM) demonstrated more significant improvements in VAS and PRTEE scores, while Group B (PRE) showed greater improvements in pain-free grip strength.

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In conclusion, the study found that Mulligan Mobilization with Movement was more effective in reducing pain and improving functional status in patients with lateral epicondylitis, while Progressive Resistive Exercises were more effective in enhancing grip strength. These results suggest the importance of tailored treatment approaches to address the specific needs of patients with lateral epicondylitis.

## DISCUSSION

The study aimed to compare the effects of Mulligan Mobilization with Movement (MWM) and Progressive Resistive Exercises (PRE) on patients with lateral epicondylitis. The results indicated that both interventions significantly improved pain, functional status, and pain-free grip strength. However, MWM was more effective in reducing pain and improving functional status, while PRE was more effective in enhancing grip strength.

These findings are consistent with previous research. Lucado et al. (2019) demonstrated that MWM significantly improved VAS pain ratings and grip strength in patients with lateral elbow tendinopathy (10-14). Similarly, Basak et al. (2018) found that both wrist manipulation and progressive exercises significantly improved elbow pain and grip strength, with combined treatments showing even greater improvements (11). Amro et al. (2010) also reported significant improvements in pain, grip strength, and PRTEE scores in patients receiving MWM and taping techniques, suggesting that a combination of techniques could lead to better outcomes (12). Lee et al. (2018) highlighted the benefits of eccentric control wrist exercises in reducing pain and improving functions impaired by tennis elbow, further supporting the effectiveness of progressive strengthening exercises (13).

One of the strengths of this study was the rigorous methodology, including randomization and the use of validated outcome measures. The inclusion of a diverse patient population and the application of standardized treatment protocols ensured the reliability and generalizability of the findings. Additionally, the study adhered to ethical guidelines, ensuring the rights and well-being of the participants (15-16).

However, the study had several limitations. The sample size was relatively small, which might have limited the statistical power and the ability to detect subtle differences between groups. The short duration of the intervention and follow-up period may not have captured long-term effects and sustainability of the treatment benefits. Furthermore, the study relied on subjective measures of pain and functional status, which could introduce bias (17-19).

Future research should consider larger sample sizes and longer follow-up periods to better understand the long-term effects of MWM and PRE. It would also be beneficial to explore the combined effects of these interventions, as previous studies suggested potential synergistic benefits. Additionally, incorporating objective measures such as imaging or biomechanical assessments could provide a more comprehensive evaluation of treatment efficacy (20-23).

## CONCLUSION

In conclusion, this study demonstrated that both MWM and PRE are effective in treating lateral epicondylitis, with each intervention offering specific advantages. MWM was more effective in reducing pain and improving functional status, while PRE excelled in enhancing grip strength. These findings underscore the importance of individualized treatment approaches tailored to the specific needs of patients. Clinicians should consider the strengths of each modality and possibly combine them to optimize clinical outcomes for patients with lateral epicondylitis.

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