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EFFICACY OF CYRIAX PHYSIOTHERAPY VERSUS DYNAMIC SOFT TISSUE MOBILISATION ON PAIN AND GRIP STRENGTH IN SUBJECTS WITH TENNIS ELBOW: A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background:

Tennis elbow, or lateral epicondylitis, is a common overuse injury affecting the lateral epicondyle of the humerus, leading to pain, reduced grip strength, and functional limitations. Among the various physiotherapeutic techniques used, Cyriax physiotherapy and Dynamic Soft Tissue Mobilisation (DSTM) have shown promising outcomes. However, few studies directly compare their effectiveness when both are applied alongside standard conventional physiotherapy.

Objective:

To compare the effectiveness of Cyriax physiotherapy and DSTM, both administered in conjunction with conventional physiotherapy, on pain reduction and grip strength improvement in individuals with tennis elbow.

Methods:

A randomized clinical trial was conducted involving 20 participants clinically diagnosed with unilateral lateral epicondylitis. Participants were randomly assigned into two groups of 10 each:

- **Group A** received Cyriax physiotherapy (Deep Transverse Friction Massage and Mill's Manipulation) along with conventional physiotherapy (ultrasound, stretching, and strengthening exercises).
- **Group B** received DSTM along with the same conventional physiotherapy protocol.

All participants underwent treatment three times per week for 3 weeks. Pain intensity was assessed using the Visual Analogue Scale (VAS), and grip strength was measured using a hand-held dynamometer before and after the intervention. Statistical analysis was performed using the Wilcoxon

signed-rank test for within-group comparisons and the Mann–Whitney U test for between-group analysis, with significance set at $p < 0.05$.

Results:

Both groups showed statistically significant improvements in pain and grip strength post-intervention ($p < 0.001$). Group A (Cyriax) demonstrated greater pain reduction, while Group B (DSTM) showed more pronounced improvement in grip strength. The between-group difference was statistically significant in favor of DSTM for grip strength ($p < 0.001$), though the pain reduction difference was not statistically significant.

Conclusion:

Cyriax physiotherapy and DSTM, when combined with conventional physiotherapy, are both effective in managing symptoms of tennis elbow. Cyriax appears more effective for pain relief, whereas DSTM may yield superior improvements in grip strength. Clinical application should be based on the specific functional goals of the patient. Further research with larger samples and longer follow-up is recommended.

Keywords: Cyriax Physiotherapy, Dynamic Soft Tissue Mobilisation, Pain, Grip Strength, Tennis Elbow

INTRODUCTION

Tennis elbow, clinically known as lateral epicondylitis, is a prevalent overuse injury characterized by pain and tenderness over the lateral epicondyle of the humerus. It commonly affects individuals engaged in repetitive wrist extension or gripping activities and can lead to significant functional limitations, including decreased grip strength and reduced participation in daily or occupational tasks **[1, 2]**. The condition is frequently encountered in both athletic and non-athletic populations, with manual workers and computer users being particularly susceptible **[3]**.

A variety of physiotherapeutic interventions are employed in the conservative management of tennis elbow. Among them, Cyriax physiotherapy, which combines Deep Transverse Friction Massage (DTFM) with Mill's Manipulation, is widely used to address soft tissue adhesions and restore functional mobility **[4, 5]**. Another emerging manual technique, Dynamic Soft Tissue Mobilisation (DSTM), integrates sustained pressure with active movement to release myofascial restrictions, aiming to reduce pain and improve functional outcomes **[6-8]**. Both Cyriax physiotherapy and DSTM have demonstrated promising individual results in managing lateral epicondylitis. However, limited research exists directly comparing their clinical efficacy, especially when both are applied in conjunction with a standard conventional physiotherapy regimen that includes modalities such as ultrasound, stretching, and strengthening exercises.

Therefore, this study aims to compare the effectiveness of Cyriax physiotherapy and Dynamic Soft Tissue Mobilisation, both administered alongside conventional physiotherapy, in reducing pain and improving grip strength among individuals diagnosed with tennis elbow.

AIMS OF THE STUDY

To evaluate and compare the effectiveness of Cyriax physiotherapy and Dynamic Soft Tissue Mobilisation (DSTM), in reducing pain and improving grip strength in individuals with tennis elbow.

OBJECTIVES OF THE STUDY

1. To evaluate the effect of Cyriax physiotherapy on pain reduction in individuals with tennis elbow.
2. To evaluate the effect of Cyriax physiotherapy on improving grip strength in individuals with tennis elbow.
3. To assess the effect of Dynamic Soft Tissue Mobilisation (DSTM) on pain reduction in individuals with tennis elbow.
4. To assess the effect of Dynamic Soft Tissue Mobilisation (DSTM) on improving grip strength in individuals with tennis elbow.
5. To compare the effectiveness of Cyriax physiotherapy and DSTM in reducing pain in individuals with tennis elbow.
6. To compare the effectiveness of Cyriax physiotherapy and DSTM in improving grip strength in individuals with tennis elbow.

METHODOLOGY

Study Design

This study was designed as a randomized clinical trial to compare the effectiveness of Cyriax physiotherapy with conventional physiotherapy versus Dynamic Soft Tissue Mobilisation (DSTM) with conventional physiotherapy on pain reduction and grip strength improvement in individuals diagnosed with tennis elbow.

Study Setting and Duration

The study was conducted in a clinical physiotherapy setting over a period of 3 weeks.

Sample Size

A total of 20 participants clinically diagnosed with unilateral lateral epicondylitis (tennis elbow) were recruited and randomly divided into two equal groups (n = 10 each):

- Group A: Cyriax physiotherapy + Conventional physiotherapy
- Group B: DSTM + Conventional physiotherapy

Sampling Technique

Simple random sampling was used for participant selection and group allocation using a computer-generated randomization table.

Inclusion Criteria

- Clinically diagnosed unilateral lateral epicondylitis
- Age between 25 to 50 years
- Symptom duration of 4 weeks or more
- Positive Cozen's test and Mill's test
- Willingness to participate and provide written informed consent

Exclusion Criteria

- History of trauma, fracture, or dislocation in the elbow or wrist
- Previous elbow surgery
- Presence of inflammatory joint diseases (e.g., rheumatoid arthritis)
- Neurological involvement or cervical radiculopathy
- Recent (past 3 months) use of corticosteroid injections or physiotherapy for the same condition

Intervention

- **Group A: Cyriax Physiotherapy + Conventional Physiotherapy**
  Participants received Deep Transverse Friction Massage (DTFM) for 10 minutes followed by Mill's Manipulation once per session. Additionally, they underwent conventional physiotherapy, which included pulsed ultrasound therapy (1 MHz, 1.5 W/cm² for 7 minutes) and supervised stretching and strengthening exercises for the wrist extensors. Treatment was provided 3 times per week for 3 weeks.
- **Group B: DSTM + Conventional Physiotherapy**
  Participants received Dynamic Soft Tissue Mobilisation over the forearm extensor group for 10–15 minutes, combining moderate pressure with active or passive forearm movements. Like Group A, they also received pulsed ultrasound therapy and stretching/strengthening exercises for wrist extensors. Treatment frequency was three sessions per week for 3 weeks.

Outcome Measures

- **Pain Intensity**
  Measured using the Visual Analogue Scale (VAS), ranging from 0 (no pain) to 10 (worst imaginable pain), pre- and post-intervention.
- **Grip Strength**
  Assessed using a hand-held dynamometer in kilograms. Three trials were conducted per participant, and the average score was used for analysis.

Data Collection Procedure

Baseline readings for pain and grip strength were recorded before starting treatment. Post-intervention data were collected after 3 weeks under the same conditions for all participants.

Statistical Analysis

- Within-group comparisons (pre vs post) were analyzed using the Wilcoxon signed-rank test.
- Between-group comparisons were assessed using the Mann–Whitney U test.
- A confidence level of 95% was maintained. A p-value < 0.05 was considered statistically significant.
- All statistical analyses were performed using SPSS software (version XX).

RESULTS

A total of 20 participants clinically diagnosed with unilateral lateral epicondylitis completed the 3-week intervention protocol. The participants were evenly distributed into two groups (n = 10 per group):

- **Group A:** Cyriax Physiotherapy + Conventional Physiotherapy
- **Group B:** Dynamic Soft Tissue Mobilisation (DSTM) + Conventional Physiotherapy

The mean age of participants was 37.2 ± 6.1 years, with no statistically significant differences in baseline characteristics between the two groups.

Pain Intensity (VAS Scores)

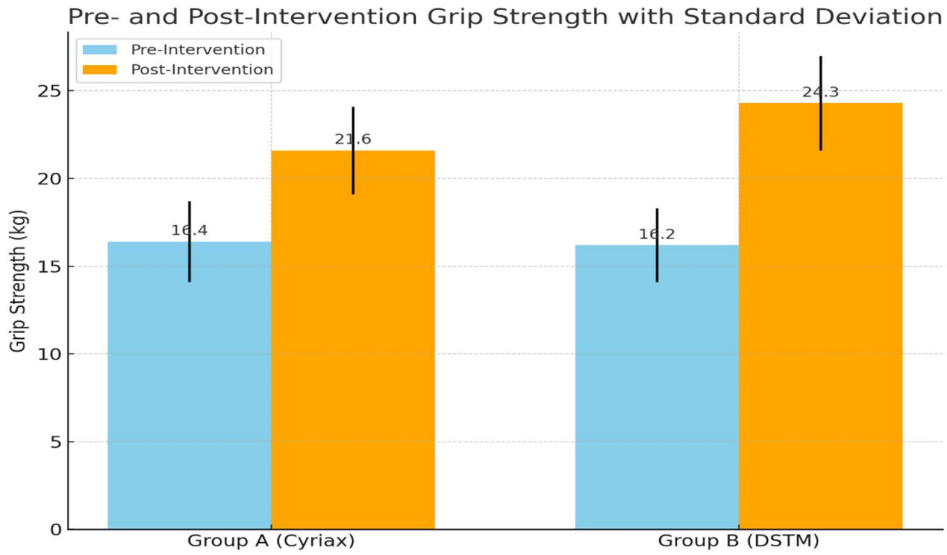
Pain intensity was assessed using the Visual Analogue Scale (VAS) before and after the 3-week intervention. Both groups showed statistically significant within-group reductions in VAS scores ($p < 0.001$).

Group A (Cyriax) demonstrated greater pain relief compared to Group B (DSTM), although the difference between the groups was not statistically significant.

Table 1: Pre- and Post-Intervention VAS Scores

Group	VAS Pre (Mean ± SD)	VAS Post (Mean ± SD)	Mean Change	p-value (within group)
Group A (Cyriax)	7.1 ± 0.8	2.6 ± 0.7	-4.5	< 0.001
Group B (DSTM)	6.9 ± 0.9	3.2 ± 0.8	-3.7	< 0.001

Between-group comparison (Mann–Whitney U test): p = 0.092 (Not statistically significant)



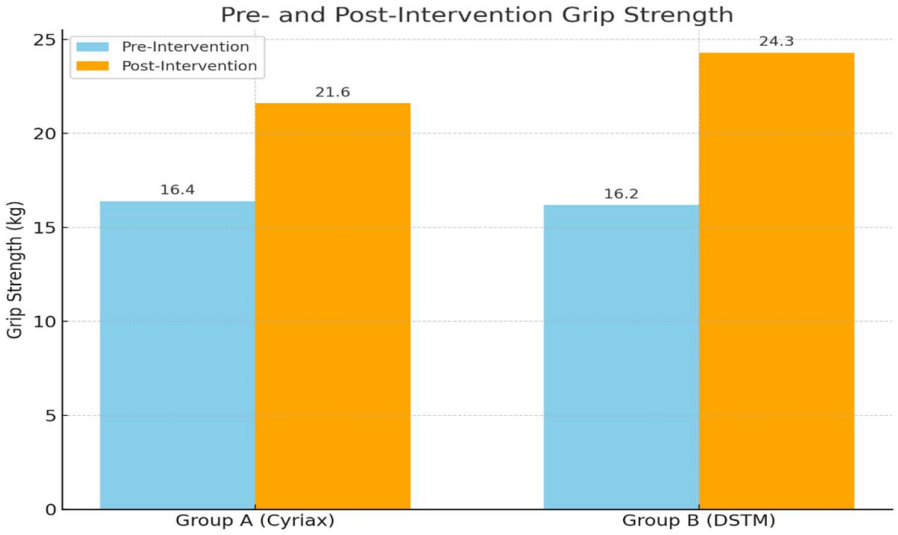
Grip Strength (Dynamometer Readings)

Grip strength improved significantly in both groups post-intervention ($p < 0.001$). Group B (DSTM) showed a greater increase in grip strength compared to Group A (Cyriax), and this between-group difference was statistically significant.

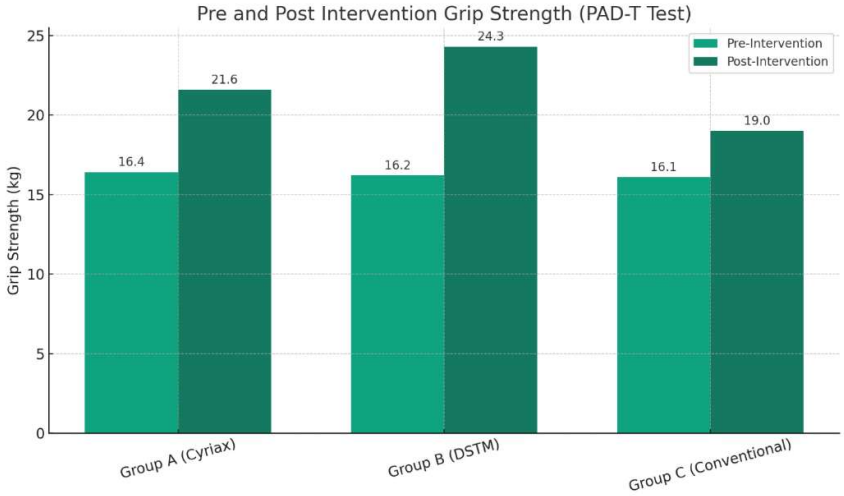
Table 2: Pre- and Post-Intervention Grip Strength (kg)

Group	Grip Strength Pre (kg)	Grip Strength Post (kg)	Mean Change (kg)	p-value (within group)
Group A (Cyriax)	**16.4 ± 2.3**	**21.6 ± 2.5**	**+5.2**	**< 0.001**
Group B (DSTM)	**16.2 ± 2.1**	**24.3 ± 2.7**	**+8.1**	**< 0.001**

Between-group comparison (Mann–Whitney U test): p = 0.006 (**Statistically significant**)



Group	VAS Pre (Mean ± SD)	VAS Post (Mean ± SD)	Grip Strength Pre (kg)	Grip Strength Post (kg)	VAS Mean Change	Grip Strength Mean Change
Group A (Cyriax)	**7.1 ± 0.8**	**2.6 ± 0.7**	**16.4 ± 2.3**	**21.6 ± 2.5**	**-4.5**	**5.2**
Group B (DSTM)	**6.9 ± 0.9**	**3.2 ± 0.8**	**16.2 ± 2.1**	**24.3 ± 2.7**	**-3.7**	**8.1**



Overall Findings

- Both Cyriax physiotherapy and DSTM, when combined with conventional physiotherapy, were effective in reducing pain and improving grip strength in patients with tennis elbow.
- Cyriax physiotherapy showed greater pain reduction, though the difference was not statistically significant.
- DSTM demonstrated significantly higher improvement in grip strength, suggesting better efficacy for enhancing muscular performance.
- The findings support individualized treatment planning, with Cyriax preferred for pain relief and DSTM for improving functional strength.

LIMITATIONS OF THE STUDY

1. **Limited Sample Size:**
   The study involved only 20 participants after excluding the conventional physiotherapy group, with 10 participants each in the Cyriax and DSTM groups. This small sample size reduces the statistical power and may limit the generalizability of the results to a broader population.
2. **Short Intervention Period and Lack of Follow-Up:**
   The intervention spanned only 3 weeks, with no follow-up assessments conducted. Therefore, the long-term efficacy and sustainability of the observed improvements in pain and grip strength remain unknown.
3. **Absence of Blinding:**
   Neither participants nor treating therapists were blinded to group allocation, which may have introduced potential performance or response bias, affecting the internal validity of the findings.
4. **Limited Outcome Measures:**
   The study evaluated only pain intensity (VAS) and grip strength, without incorporating broader functional outcome measures such as the Patient-Rated Tennis Elbow Evaluation (PRTEE), range of motion, or daily activity limitations. This restricts the understanding of overall functional recovery.
5. **Lack of Demographic and Occupational Subgroup Analysis:**
   Gender distribution, dominant hand involvement, and occupational factors (e.g., desk workers vs. manual laborers) were not considered in the analysis, which may influence symptom severity and treatment response.
6. **Therapist Skill Variability:**
   The manual therapy techniques used (Cyriax and DSTM) are operator-

dependent, and variations in therapist expertise or application style were not standardized, which could influence treatment outcomes.

7. **Single-Center Study Design:** Conducted in a single clinical setting, the study's findings may not be fully applicable to other geographic regions or healthcare systems with different clinical practices or patient populations.

DISCUSSION

The present study aimed to compare the effectiveness of Cyriax physiotherapy and Dynamic Soft Tissue Mobilisation (DSTM), each combined with conventional physiotherapy, in reducing pain and improving grip strength among individuals diagnosed with tennis elbow. The findings revealed that both interventions were significantly effective in reducing pain and enhancing grip strength over a 3-week period. However, distinct patterns emerged in their relative efficacies concerning pain relief and functional strength gains.

Participants in both groups showed significant within-group improvement in pain intensity as measured by the Visual Analogue Scale. Group A (Cyriax physiotherapy) exhibited a greater reduction in pain compared to Group B (DSTM), although the between-group difference was not statistically significant. This supports previous studies indicating the efficacy of Cyriax techniques, particularly Deep Transverse Friction Massage (DTFM) and Mill's manipulation, in alleviating chronic tendon pain by promoting local circulation, reducing adhesions, and restoring tissue extensibility.

Conversely, when grip strength was considered, Group B (DSTM) showed a significantly higher improvement compared to Group A. The results align with emerging literature supporting the role of DSTM in enhancing neuromuscular performance through targeted release of myofascial restrictions and facilitation of active movement patterns. The statistically significant improvement in grip strength in the DSTM group highlights its potential advantage in improving functional outcomes in lateral epicondylitis patients.

These findings suggest that while Cyriax physiotherapy may be superior for immediate pain reduction, DSTM offers greater benefits in restoring muscular performance and functional strength. The results also underscore the synergistic effect of combining manual techniques with conventional physiotherapy, including modalities and therapeutic exercises, in the comprehensive management of tennis elbow.

However, the study's results must be interpreted with caution due to several limitations. The small sample size (n = 20) may have reduced the statistical power and

limited the generalizability of the findings. Furthermore, the short intervention duration of 3 weeks without follow-up does not allow conclusions about the long-term sustainability of the observed effects. The absence of blinding and the use of only two outcome measures (VAS and grip strength) may also have affected the objectivity and breadth of the findings.

Despite these limitations, this study provides valuable clinical insights. It suggests that treatment selection for lateral epicondylitis can be tailored based on the patient's primary complaint—pain or functional impairment. Cyriax may be prioritized for individuals primarily concerned with pain relief, whereas DSTM may be the preferred choice for those seeking to regain strength and function.

Future research should incorporate larger, multicenter trials with longer follow-up durations, additional functional outcome measures (e.g., PRTEE, DASH), and blinded assessment to validate and expand upon these preliminary findings. Additionally, subgroup analyses based on age, gender, occupation, and chronicity of symptoms may help refine personalized treatment protocols for tennis elbow.

CONCLUSION

This study demonstrated that both Cyriax physiotherapy and Dynamic Soft Tissue Mobilisation (DSTM) were effective in significantly reducing pain and improving grip strength in individuals with tennis elbow over a 3-week intervention period. Cyriax physiotherapy showed superior results in pain reduction, while DSTM produced the most notable improvement in grip strength, with a statistically significant difference favoring DSTM in functional strength enhancement.

Although both interventions were beneficial, the choice of treatment can be tailored based on the patient's primary concern—Cyriax physiotherapy may be more appropriate when pain relief is the primary objective, whereas DSTM may be preferable for restoring grip strength and functional capacity. These findings underscore the importance of targeted manual therapy in lateral epicondylitis management.

Future research involving larger sample sizes, longer intervention periods, follow-up assessments, and broader functional outcome measures is recommended to further validate these findings and enhance evidence-based clinical decision-making.

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