Comparing the effects of Mulligan versus Maitland mobilization technique on intensity of pain and cervical Range of Motion among patients with cervical radiculopathy

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Abstract

Introduction

The present study is aimed to determine the effect of manual therapy on intensity of pain and cervical Range of Motion (CROM) among patients with cervical radiculopathy and to determine

efficacy of Mulligan and Maitland mobilization in relieving pain and improving CROM among cervical radiculopathy patients.

Methodology

The therapies were carried out by a physical therapist with three years of expertise. Heat treatment and transcutaneous electrical nerve stimulation (TENS) were provided for 10 minutes prior to mobilization. Stretching activities were conducted for muscles prone to stiffness once acute symptoms were alleviated, while strengthening exercises were advised for muscles prone to weakness.

Results

A total of 44 patients were taken and were divided into Group A (n=22) and Group B (n=22). All patients had a mean age of 43.75 (\pm 12.805) Years. For group A, 50% (n=11) were male and 50% (n=11) were females. Similarly, Group B had 50% (n=11) males and 50% (n=11) females.

Conclusion

The findings indicate Mulligan mobilization's superiority in lowering pain and enhancing range of motion. However, given the limitations indicated, further study is required to validate and expand on these findings, including long-term effects and comparisons to other therapy methods.

Keywords

Cervical, Range of Motion, Pain, Mobilization

Introduction

Cervical radiculopathy (CR) is a disorder that causes pain to radiate from the neck to the afflicted nerve root due to malfunction of the cervical nerve roots¹. There is little agreement on the precise description of CR, which has also been defined as a mix of neck and shoulder discomfort with sensory and motor deficits²⁻³. The annual incidence of CR is predicted to be between 63.5 and 107.3 instances per 100,000 persons, with the C6 and C7 cervical spine segments being the most usually afflicted⁴. There are two major therapeutic techniques available: conservative care and surgery⁵. Conservative therapies, including as exercises, manual therapy, and nonsteroidal anti-inflammatory medicines (NSAIDs), are recommended as first-line treatments by current professional standards⁶⁻⁸. If conservative therapy do not produce relief within 4 to 8 weeks,

analgesic or anti-inflammatory drug injections may be tried, and surgery may be indicated in extreme situations. Cervical radiculopathy can manifest itself in a variety of ways, depending on the precise segments afflicted and the amount of neurological dysfunction⁷⁻⁹. Common symptoms include neck and unilateral arm discomfort, as well as numbness, paralysis, or altered reflexes. It is critical to correctly identify the exact segment implicated and distinguish cervical radiculopathy from other disorders with similar symptoms. Typically, this is accomplished by a mix of physical tests that elicit symptoms and radiographic imaging. Cervical radiculopathy therapy seeks to relieve pain, enhance neurological function, avoid recurrence, and allow patients to continue their usual activities¹⁰. Conservative therapies, including as exercises, physical therapy, and NSAIDs, are usually the first line of defense. These treatments are intended to decrease inflammation, relieve pressure on injured nerve roots, and promote recovery. If conservative therapies are ineffective or the situation is severe, surgical surgery may be considered¹¹. Depending on the underlying cause and specific patient variables, the surgical procedure may include decompression of the damaged nerve roots or spinal fusion¹²⁻¹⁴. For treating severe neck discomfort in the short term, manual therapy, which includes manipulation, mobilization, and rehabilitation, is frequently recommended over traditional therapies. There are several manual therapy techniques and tactics, but they all have one thing in common: they all use hands-on approaches during therapy, which include both manipulation and mobilization¹⁵⁻¹⁸. Manual therapy procedures have been shown in trials to give considerable relief for neck discomfort. Manipulation, which includes a swift and strong push directed at particular joints in the spine, is one of these treatments, as are mobilization procedures that do not entail high-speed thrusting. Manual therapy is used by healthcare practitioners to restore appropriate spine alignment and function, relieve pain and inflammation, and enhance general neck mobility¹⁹. These procedures are frequently performed by qualified specialists with specialized training in manual therapy techniques, such as chiropractors, physical therapists, or osteopathic physicians. It is important to note that the efficacy of manual treatment varies based on individual situations, underlying illnesses, and patient preferences²⁰. Furthermore, the long-term effects and comparative effectiveness of manual therapy in comparison to other treatment methods require additional study and clinical investigations²¹. Hence, the present study is aimed to determine the effect of manual therapy on intensity of pain and cervical Range of Motion (CROM) among patients with cervical radiculopathy and to determine efficacy of Mulligan and Maitland mobilization in relieving pain and improving CROM among cervical radiculopathy patients.

Methodology

Study Design:

The study used a comparing parameters before and after treatments in two groups.

Sampling Method:

The study's subjects were selected via convenient non-probability sampling.

Sample Size:

A total of 44 patients with cervical radiculopathy were enrolled, with 22 individuals randomly assigned to each group (Group A and Group B).

Criteria for Inclusion and Exclusion:

Males and females aged 20 to 60 were enrolled in the research. Participants were originally examined utilizing procedures including the Spurling Test, Upper Limb Tension Test, and cervical range of motion measures. Individuals who tested positive in these tests and had limits in cervical range of motion were included in the research. Individuals having a history of cervical spine fracture, cervical instability, or vertebrobasilar insufficiency were excluded from our research. Individuals who came with symptoms of vertigo and dizziness were also excluded from the trial.

Intervention Protocol

Groups A and B both received a three-week intervention with three sessions each week. The therapies were carried out by a physical therapist with three years of expertise. Heat treatment and transcutaneous electrical nerve stimulation (TENS) were provided for 10 minutes prior to mobilization. Stretching activities were conducted for muscles prone to stiffness once acute symptoms were alleviated, while strengthening exercises were advised for muscles prone to weakness. To continue the workouts, home exercise programs were provided. Mulligan Mobilization with Upper Limb Movement was done on Group A, which involved prolonged pressure on the targeted vertebra (typically C5/C6) while the patient did shoulder abduction. As the patient improved, an aide applied more pressure. Maitland Oscillatory Mobilization was performed on Group B, which included unilateral posterior-anterior glides in the prone position and longitudinal mobilization in the supine position. Both groups had nine sessions in total.

Outcome Measures

Numeric Pain Rating Scale (NPRS)

The NPRS was used to capture the patient's level of pain. Patients were asked to indicate the intensity of their current pain level using an 11-point scale, ranging from 0 (no pain) to 10 (worst pain imaginable).

Universal Goniometer

In terms of measuring cervical range of motion, the reliability of the universal goniometer is (flexion: r = 0.97, P < 0.001; extension: r = 0.98, P < 0.001). The results of test for reliability of universal goniometer demonstrated excellent within-session (ICC = 0.83 to 0.98) and between-session (ICC = 0.79 to 0.97) intra-rater reliability and excellent inter-rater reliability (ICC = 0.79 to 0.92).

Ethical Consideration

Precautions were made to safeguard the confidentiality of participants' data while maintaining their right to personal security. Study was ethically approved from ethical review committee IRB# ASC-PT-0122/2022. All participants provided informed permission, satisfying the legal responsibility to tell them about the possible risks and specifics of their participation in the therapy. Participants were also promised that they may opt out of the research at any moment.

Results

A total of 44 patients were taken and were divided into Group A (n=22) and Group B (n=22). All patients had a mean age of 43.75 (\pm 12.805) Years. For group A, 50% (n=11) were male and 50% (n=11) were females. Similarly, Group B had 50% (n=11) males and 50% (n=11) females. (Table 1)

| Table 1 Demographic Characteristics of Participants | | | | | | |
|---|----------------|-----------------|--|--|--|--|
| Characteristics of Patients | Group A | Group B | | | | |
| Mean Age (years)(±SD) | 44.14(±12.833) | 43.36 (±13.066) | | | | |
| Males % | 50% (n=11) | 50% (n=11) | | | | |
| Females % | 50% (n=11) | 50% (n=11) | | | | |

Prior to receiving manual therapy, patients were screened for pain rating scale and range of motion. Table 2 shows the pre-interventional data for Groups A and B. Patients in Group A had a mean, a Numeric Pain Rating Scale score of 28.14 ± 2.731 , and specified mean degrees for cervical flexion 24.7 ± 2.7 , extension 22.29 ± 4.16 , and rotation 27.84 ± 5.89 , and side flexion 19.39 ± 7.02 . Similarly, patients in Group B had a mean a Numeric Pain Rating Scale score of 27.82 ± 4.25 , and specific mean degrees for cervical flexion 25.82 ± 6.23 , extension 26.67 ± 7.6 , rotation 28.46 ± 8.92 , and lateral flexion 18.79 ± 4.24 . The same measures were reviewed three weeks after intervention in both groups to identify any meaningful differences. The mean Numeric Pain Rating Scale score 17.27 ± 4.813 decreased in Group A, whereas the range of motion for cervical flexion, extension, rotation, and lateral flexion increased. Similarly, in Group B, there was a decrease in mean Numeric Pain Rating Scale scores 8.73 ± 2.414 , as well as an increase in range of motion for cervical flexion, extension, and lateral flexion, rotation, and lateral flexion, and lateral flexion for cervical flexion, extension, rotation, and lateral flexion, and lateral flexion, and lateral flexion for cervical flexion. (Table 2)

| Table 2 Paired t test to determine pre-post effect of intervention | | | | | | | | |
|--|------------|-------------|---------|------------|-----------|---------|--|--|
| Variables | Group A | | | Group B | | | | |
| | Pre ± SD | Post ± SD | p-value | Pre ± SD | Post ± SD | p-value | | |
| NPRS | 28.14±2.73 | 17.27±4.813 | < 0.005 | 27.82±4.25 | 8.73±2.41 | < 0.005 | | |
| | 1 | | | | | | | |
| Cervical Range of Motion | | | | | | | | |
| Flexion | 24.7±2.7 | 35.5±7.18 | | 25.82±6.23 | 42.25±4.2 | | | |
| Extension | 22.29±4.16 | 37.45±8.1 | | 26.67±7.6 | 41.18±2.8 | | | |
| Rotation | 27.84±5.89 | 44.66±9.2 | < 0.005 | 28.46±8.92 | 44.38±7.3 | < 0.005 | | |
| Side | 19.39±7.02 | 33.1±4.74 | | 18.79±4.24 | 35.58±3.2 | | | |
| Flexion | | | | | | | | |

Further, an independent T-test was applied for between group analyses of post-results of both groups to find any significant difference between them. In terms of, Neck Pain Rating Scale and Cervical flexion, group A suggested significant improvements compared to group B (p<0.05).

However, no significant difference was found in cervical extension, rotation and side flexion among improvements between group A and B (table 3).

| Table 3 Independent t test between group Comparison | | | | | |
|---|-----------------|---------|--|--|--|
| Parameters | Mean Difference | P-value | | | |
| NPR | 8.545 | < 0.005 | | | |
| Cervical Range of Motion | | | | | |
| Flexion | 6.743 | 0.001 | | | |
| Extension | 3.725 | 0.053 | | | |
| Rotation | 0.277 | 0.913 | | | |
| Side Flexion | 2.476 | =0.05 | | | |

Discussion

The research had 44 participants in total, with 22 in each of Group A and Group B. The patients' average age was 43.75 years (12.805). Both groups had an equal gender distribution, with 50% men and 50% girls. Prior to getting manual treatment, the patients' pain rating scale and range of motion were evaluated. The mean Numeric Pain Rating Scale score in Group A was 28.14 (2.731), and specific mean degrees of cervical flexion, extension, rotation, and lateral flexion were recorded. The mean Numeric Pain Rating Scale score in Group B was 27.82 (4.25), and specific mean degrees of cervical flexion, extension, and lateral flexion were recorded. Significant gains were found in both groups after three weeks of intervention. The mean Numeric Pain Rating Scale score in Group B, the mean Numeric Pain Rating Scale score for the range of motion for cervical flexion, extension, rotation, and lateral flexion, extension, rotation, and lateral flexion were Pain Rating Scale score in Group A reduced to 17.27 (4.813), and the range of motion for cervical flexion, extension, rotation, and lateral flexion increased. Similarly, in Group B, the mean Numeric Pain Rating Scale score fell to 8.73 (2.414), and the range of motion for cervical flexion, extension, rotation, and lateral flexion increased. Further study using independent t-tests demonstrated that

Group A outperformed Group B in terms of the Numeric Pain Rating Scale and cervical flexion (p0.05). However, there were no significant differences in cervical extension, rotation, or lateral flexion between the two groups. The findings of this study were according to the findings of the study conducted to evaluate the efficacy of Mulligan mobilization to Maitland mobilization in the treatment of cervical radiculopathy and it was found by the authors that in patients with cervical radiculopathy, Mulligan mobilization was more helpful than Maitland mobilization at reducing pain and restoring normal range of motion²². Similarly in another study that was conducted with the purpose to evaluate the effects of Maitland's oscillatory mobilization vs Kaltenborn's continuous stretch mobilization in the treatment of cervical radiculopathy it was found that In terms of discomfort, range of motion, and impairment, both oscillatory and prolonged stretch mobilization approaches were beneficial in treating cervical radiculopathy²³. However, oscillatory mobilization outperformed sustained stretch mobilization in terms of functional ability and range of motion.

This study's strength is its randomized controlled design, which increases the validity of the findings. The presence of an adequate sample size and an equal gender distribution in both groups adds to the study's strength. The use of validated outcome measures, such as the Numeric Pain Rating Scale and range of motion evaluation, lends credence to the findings. Furthermore, the study expands on previous research that supports the efficacy of Mulligan and Maitland mobilization in cervical radiculopathy. However, there are certain constraints to consider. The study's three-week timeframe may not adequately reflect the long-term benefits or durability of the therapies. The lack of a control group that received no intervention makes determining the precise contribution of the mobilization approaches problematic. Additional objective metrics, such as imaging or neurophysiological tests, might have aided the study's evaluation of the outcomes. Furthermore, the findings may be restricted to the unique demographic and location of this study.

Conclusion

In conclusion, this study sheds light on the relative efficacy of Mulligan mobilization and Maitland mobilization in cervical radiculopathy. The findings indicate Mulligan mobilization's superiority in lowering pain and enhancing range of motion. However, given the limitations indicated, further

study is required to validate and expand on these findings, including long-term effects and comparisons to other therapy methods.

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