Determining the effects of mobilization techniques in reducing neck disability index among patients with cervical radiculopathy-----A Randomized Controlled Trial

Author 1 (Corresponding Author)
Dr. Majida Shakir
Physiotherapist
JPMC, Karachi

Author 2
Dr. Aqsa Faiz
Assistant Professor
South City Hospital, Karachi

Author 3
Dr. Anam Raza
Assistant Professor
Royal College of Physiotherapy, RYK

Author 4
Dr. Salma Sohail
Senior Lecturer
Taqwa Institute of Physiotherapy and Health Sciences
Karachi

Author 5
Dr. Madiha Shabbir
Lecturer
Taqwa Institute of Physiotherapy and Health Sciences
Karachi

Abstract

Introduction

While conservative therapy may be effective, it is crucial to emphasize that very few of them have been properly investigated in randomized, placebo-controlled studies. It is therefore the present study is aimed to determine the effects of mobilization techniques in reducing neck disability index among patients with cervical radiculopathy

Methodology

A Randomized controlled trial was conducted in which parameters between two groups. A total of 44 participants diagnosed with cervical radiculopathy were included in the study. Participants were then equally divided into group A and group B constituting each group with 22 individuals. Study included both males and females with an age group between 20-60 years.

Results

Following their respective therapies, both Group A and Group B displayed statistically significant decreases in neck impairment. Mulligan Mobilization resulted in a more significant drop in Northwick Park Questionnaire scores in Group A, with a mean difference of 20.955 ± 4.25 ($p<0.05$). Group B, which received Maitland Mobilization, had a drop in Northwick Park Questionnaire scores, with a mean difference of 9.72 ± 6.01 ($p<0.05$).

Conclusion

Mobilization approaches resulted in significant improvements in neck disability ratings, according to the findings. Mulligan mobilization, on the other hand, reduced neck impairment more than Maitland mobilization.

Keywords

Cervical Radiculopathy, Neck Disability, Pain

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 roots. However, there is no agreement on its specific meaning[1]. Others emphasize radiating arm discomfort with concomitant motor, reflex, and sensory alterations caused by certain neck positions or motions. The annual incidence of CR is predicted to be between 63.5 and 107.3 per 100,000 persons, with the C6 and C7 cervical spine

segments being the most typically afflicted[2]. Conservative therapy and surgery are the two basic methods of CR management. Exercise, manual therapy, and nonsteroidal anti-inflammatory medicines (NSAIDs) are among the first-line treatments recommended by clinical recommendations. If these conservative therapies do not relieve the symptoms within 4 to 8 weeks, further procedures such as analgesic/anti-inflammatory injections or surgery may be considered depending on the severity of the symptoms[3-4]. While systematic reviews have shown that several therapies, including as exercise, manual therapy, mechanical traction, and manipulations, are beneficial, bigger research and standardized treatment procedures are needed to get better results[5]. Despite the existing data, the Task Force on Neck Pain and Its Associated Disorders (TFNPAD) concluded that there was inadequate evidence to prescribe particular therapies for CR, noting the conflicting nature of the research on the efficacy of manual therapy in radiculopathy. Patients suffering with cervical radiculopathy (CR) frequently experience significant functional restrictions and disability, with a peak frequency between the ages of 50 and 54[6]. This is because structural and functional variables contribute to brain inflammation, edema, hypoxia, ischemia, and other associated processes. According to a research done inside the US military, the incidence of CR is 1.79 per 1000 person-years. Current CR treatment options include both surgical and nonsurgical treatments[7-8]. However, because to the possible consequences, such as neighboring segment degeneration and loss of intervertebral disc height, surgical treatment of CR remains contentious. Conservative therapies, on the other hand, provide alternatives to surgery and have shown promise in relieving symptoms and improving neurological function in CR patients[9]. Manual treatment, exercise, traction, the use of a cervical collar, and the use of nonsteroidal anti-inflammatory medicines (NSAIDs) are examples of these methods. While these conservative therapy may be effective, it is crucial to emphasize that very few of them have been properly investigated in randomized, placebo-controlled studies[10-11]. It is therefore the present study is aimed to determine the effects of mobilization techniques in reducing neck disability index among patients with cervical radiculopathy

Methodology

A Randomized controlled trial was conducted in which parameters between two groups. A total of 44 participants diagnosed with cervical radiculopathy were included in the study. Participants were then equally divided into group A and group B constituting each group with 22 individuals. Study included both males and females with an age group between 20-60 years. They were initially

screened through Spurling Test, Upper Limb Tension Test and Cervical range of motion measurement. Individuals that were found positive in these tests along with hypo-mobility of cervical range of motion were then finally included in the study. Individuals with history of cervical spine fracture, cervical instability or vertebrobasilar insufficiency were not included. Furthermore, those individuals that were presented with complaints of vertigo and dizziness were also excluded from the study.

Outcome Measure

The Northwick Park Neck Pain Questionnaire (NPQ) was adapted from the Oswestry Questionnaire. The questions covered many activities which were likely to be affected by neck pain. Each section contained five statements of increasing difficulty and the patient was asked to tick only the one box which most closely described their current situation. Each question was scored between 0-4 and summated. If all nine sections were completed the NPQ percentage score was calculated by dividing total score of patient by maximum possible, score i.e. 36 and then multiplying the result by hundred. This questionnaire has a good short-term repeatability ($r = 0.84$, $K = 0.62$)[12].

Intervention Strategy

Patients in Group A and Group B got total of 9 treatment sessions overall during a three-week period, with each group having three sessions each week. A physical therapist with three years of clinical experience provided the therapy. Both groups got 10 minutes of heat treatment and transcutaneous electric nerve stimulation (TENS) prior to the mobilization procedures. Patients in Group A were given Mulligan Mobilization with Upper Limb Movement to help them restore cervical function. The therapist stood behind the patient, their body and right forearm holding the patient's head. The therapist used their thumbs to provide prolonged pressure to the targeted vertebra (C5/C6) as the patient actively performed shoulder abduction without discomfort. During future visits, an aide applied further overpressure as the patient improved. Mobilizations were carried out within the range of motion and without pain. Patients in Group B underwent Maitland (Oscillatory mobilization) treatments. While the patient was prone, three sets of 15 repetitions of unilateral posterior-anterior glides on the afflicted region were performed. In the supine position, longitudinal mobilization techniques were also used. Individual needs and the evolution of the disease were used to regulate the degree of mobilization. There were no thrust manipulation methods applied. Both groups went through the therapeutic program for three weeks, with a total

of nine sessions. The particular mobilization procedures and grades were adjusted to each patient's condition and progression.

Ethical Consideration

The confidentiality of participant data was protected, with the recognition that maintaining personal security and privacy is an inherent right of persons. 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 promised that they may withdraw from the study at any moment, emphasizing their autonomy and freedom to make their own decisions about their involvement. The study was approved for ethical review committee of Al Shifa Hospital IRB#ASC-PT-0129/08/2022

Results

The objective of the study was to determined effectiveness of Maitland's mobilization and the Mulligan method affected pain rating, neck disability, and range of motion (including cervical flexion, extension, side flexion, and rotation) in those who had chronic neck discomfort. A total of 44 patients were registered, with Group A having 22 individuals and Group B having another 22 people. All patients had a mean age of 43.75 ± 12.8 years. There were an equal number of men (n=11) and females (n=11) in Group A, and an equal number of males (n=11) and females (n=11) in Group B. Table 1 breaks out the demographic statistics for both groups.

Table 1 Demographics Characteristics of the participants included in the study

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)

Following their respective therapies, both Group A and Group B displayed statistically significant decreases in neck impairment. Mulligan Mobilization resulted in a more significant drop in Northwick Park Questionnaire scores in Group A, with a mean difference of 20.955 ± 4.25 $p<0.05$. Group B, which received Maitland Mobilization, had a drop in Northwick Park Questionnaire scores, with a mean difference of 9.72 ± 6.01 $p<0.05$. An independent t-test was used to compare the post-intervention results of Group A with Group B. In terms of the Northwick Park Questionnaire, the analysis indicated a significant difference between the two groups $p < 0.05$. Group A, who got Mulligan Mobilization, had much greater improvements than Group B, which received Maitland Mobilization. This shows that Mulligan Mobilization was more effective than Maitland Mobilization in minimizing neck impairment. (Table 2)

Table 2 Within group Comparison

Variables	**Average ± SD (Pre)**	**Average ± SD (Post)**	**Mean Difference (MD)**	**p-value**
Group A	30.05±3.51	9.09±1.77	20.95±4.25	<0.05
Group B	30.36±3.56	20.64±3.54	9.72±6.01	<0.05
Between Group Analyses				
Variables	**Group A Post value ± SD**	**Group B Post value ± SD**	**MD**	**p-value**
NPQ	9.09±1.77	20.64±3.54	11.545	<0.05

Discussion

The study sought to determine the efficacy of Maitland's mobilization and the Mulligan approach in lowering pain rating, neck impairment, and increasing range of motion in those suffering from chronic neck pain. There were 44 patients in all, with 22 in Group A and 22 in Group B. All participants had a mean age of 43.75±12.8 years. Following their individual treatments, both groups had considerable decreases in neck disability. Mulligan Mobilization resulted in a more substantial decline in Northwick Park Questionnaire scores with a mean difference of 20.955 ±4.25, whereas Maitland Mobilization resulted in a mean difference of 9.727 ± 6.01. The

independent t-test found a significant difference between the two groups, demonstrating that Mulligan Mobilization was more successful than Maitland mobilization in improving neck dysfunction. According to a study aimed to examine the efficacy of Mulligan and Maitland mobilization methods in treating cervical radiculopathy. A total of 200 patients were randomized at random to one of two groups: Group A (Maitland mobilization) or Group B (Mulligan mobilization) [13]. The survey discovered that males (62%) outnumbered females (38%). The average age in Group A was 38.90 ± 6.97 years, and 42.07 ± 7.03 years in Group B, with a p-value of 0.085 suggesting that there was no significant age difference between the group[13-14]. Both groups exhibited equal levels of pain before therapy, but after treatment, Group B had considerably reduced pain (mean of 2.53 ± 1.57) compared to Group A (mean of 3.40 ± 1.73) with a p-value of 0.05. Similarly in another study that was aimed to compare the efficacy of Mulligan and Maitland mobilization methods in reducing pain intensity and increasing cervical range of motion (CROM) in individuals with cervical radiculopathy[15]. Heat treatment and transcutaneous electrical nerve stimulation (TENS) were delivered prior to mobilization by a physical therapist with three years of expertise. Stretching exercises were given to tight muscles, while strengthening activities were given to weak muscles. Mulligan mobilization was shown to be more helpful in decreasing discomfort and enhancing range of motion[16-17]. However, the study acknowledged several limitations and urged that more research be conducted to evaluate and expand on these findings, such as long-term effects and comparisons to alternative treatment options. In another study that was aimed to compare the effectiveness of Mulligan manual traction and neural mobilization approaches in the treatment of pain in cervical radiculopathies. The research was carried out at two teaching hospitals over a six-month period. Both groups received hot pack and transcutaneous electrical nerve stimulation (TENS) as baseline treatments, with Group A getting Mulligan traction and Group B receiving neural mobilization of the ulnar, median, and radial nerves. The results were assessed using the Numeric Pain Rating Scale (NPRS) and the Neck Disability Index (NDI), with data collected before and after the first therapy session. Both groups had significant decreases in pain intensity and improvements in functional ability[18]. The study indicated that both Mulligan manual traction and neural mobilization approaches were successful in treating pain and improving functional capacities in individuals with cervical radiculopathies, with none being superior. There are, however, some constraints to consider. Both studies lacked information on the credentials and expertise of the therapists who delivered the treatments, which might have an impact on the

effectiveness of the procedures. The research concentrated on short-term outcomes rather than long-term impacts or potential negative effects. Furthermore, the lack of treatment-free control groups makes it impossible to ascribe the observed benefits entirely to mobilization approaches. Comorbidities and concomitant therapies, for example, were not adequately investigated. Finally, the research concentrated primarily on pain relief and functional benefits, ignoring potential extra consequences. Future research should overcome these constraints in order to confirm and build on these findings. Long-term consequences, comparisons with alternative treatment approaches, and research of other pertinent outcomes should all be looked into. Furthermore, giving specific information about the therapists' credentials and experience would improve the therapeutic application of the results. By addressing these limitations, we may get a more complete knowledge of the efficacy and usefulness of Mulligan and Maitland mobilization strategies.

Conclusion

The purpose of this study was to see how successful Mulligan and Maitland mobilization treatments were at reducing neck disability in patients with cervical radiculopathy. Both mobilization approaches resulted in significant improvements in neck disability ratings, according to the findings. Mulligan mobilization, on the other hand, reduced neck impairment more than Maitland mobilization. Mulligan mobilization may be more successful in restoring neck function in individuals with cervical radiculopathy, according to these data. It should be noted that further study is required to investigate the long-term benefits, potential negative effects, and comparisons with alternative treatment options.

References

1. Khan I, Sivaganesan A, Archer KR, Bydon M, McGirt MJ, Nian H, Harrell Jr FE, Foley KT, Mummaneni PV, Bisson EF, Shaffrey C. Does neck disability index correlate with 12-month satisfaction after elective surgery for cervical radiculopathy? Results from a national spine registry. Neurosurgery. 2020 May 1;86(5):736-41.
2. Rulleau T, Abeille S, Pastor L, Planche L, Allary P, Chapeleau C, Moreau C, Cormier G, Caulier M. Effect of an intensive cervical traction protocol on mid-term disability and pain in patients with cervical radiculopathy: An exploratory, prospective, observational pilot study. Plos one. 2021 Aug 11;16(8):e0255998.

3. Liang L, Feng M, Cui X, Zhou S, Yin X, Wang X, Yang M, Liu C, Xie R, Zhu L, Yu J. The effect of exercise on cervical radiculopathy: a systematic review and meta-analysis. Medicine. 2019 Nov;98(45).
4. Gupte G, Peters CM, Buchowski JM, Zebala LP. Reliability of the Neck Disability Index and Japanese Orthopedic Association questionnaires in adult cervical radiculopathy and myelopathy patients when administered by telephone or via online format. The Spine Journal. 2019 Jul 1;19(7):1154-61.
5. Rafiq S, Zafar H, Gillani SA, Waqas MS, Zia A, Liaqat S, Rafiq Y. Comparison of neural mobilization and conservative treatment on pain, range of motion, and disability in cervical radiculopathy: A randomized controlled trial. Plos one. 2022 Dec 6;17(12):e0278177.
6. Yun YH, Lee BK, Yi JH, Seo DK. Effect of nerve mobilization with intermittent cervical segment traction on pain, range of motion, endurance, and disability of cervical radiculopathy. Physical Therapy Rehabilitation Science. 2020 Sep 30;9(3):149-54.
7. Savva C, Korakakis V, Efstathiou M, Karagiannis C. Cervical traction combined with neural mobilization for patients with cervical radiculopathy: A randomized controlled trial. Journal of Bodywork and Movement Therapies. 2021 Apr 1;26:279-89.
8. Hong JG, Kim YM. Effects of Cervical traction and Muscle Energy Technique on Pain, Neck Disability Index, Function, Range of Motion in Patients with Cervical Radiculopathy. The Journal of Korean Academy of Orthopedic Manual Physical Therapy. 2021;27(3):57-67.
9. Alshami AM, Bamhair DA. Effect of manual therapy with exercise in patients with chronic cervical radiculopathy: a randomized clinical trial. Trials. 2021 Dec;22(1):1-2.
10. Liew BX, Peolsson A, Falla D, Cleland JA, Scutari M, Kierkegaard M, Dedering A. Mechanisms of recovery after neck-specific or general exercises in patients with cervical radiculopathy. European Journal of Pain. 2021 May;25(5):1162-72.
11. Liew BX, Peolsson A, Rugamer D, Wibault J, Löfgren H, Dedering A, Zsigmond P, Falla D. Clinical predictive modelling of post-surgical recovery in individuals with cervical radiculopathy: a machine learning approach. Scientific Reports. 2020 Oct 8;10(1):16782.
12. Young IA, Dunning J, Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. Physiotherapy theory and practice. 2019 Dec 2;35(12):1328-35.
13. Li LL, Hu XJ, Di YH, Jiao W. Effectiveness of Maitland and Mulligan mobilization methods for adults with knee osteoarthritis: A systematic review and meta-analysis. World Journal of Clinical Cases. 2022 Jan 1;10(3):954.
14. Anwar F, Fazal N, Akhtar TM, ur Rehman HH, Ahmad D. Comparing the effects of Mulligan versus Maitland mobilization technique on intensity of pain and cervical Range of Motion among patients with cervical radiculopathy.
15. Niaz M, Zafar A, Sadiq U, Adil HB, Akhtar SK. Effectiveness of Maitland And Mulligan Mobilization In Cervical Radiculopathy Patients: Maitland and Mulligan Mobilization. Pakistan BioMedical Journal. 2022 Feb 28:77-9.
16. Hayat R, Akbar U, Perveen W, Ali MA, Anwar S, Asif R. Comparison of Mulligan Traction and Neural Mobilizations in the Management of Pain in Patients with Cervical

Radiculopathies; A Quasi-Experimental Study. Journal Riphah College of Rehabilitation Sciences. 2022 Dec 9;10(02).

17. Hassan F, Osama M, Ghafoor A, Yaqoob MF. Effects of oscillatory mobilization as compared to sustained stretch mobilization in the management of cervical radiculopathy: A randomized controlled trial. Journal of Back and Musculoskeletal Rehabilitation. 2020 Jan 1;33(1):153-8.
18. Aroob A, Zahoor IA, Ghaffar M, Ghaffar N, Rana AA, Shabbir S. Comparison Of the Effectiveness of Maitland Manipulation of Thoracic Spine Versus Grade I And II Maitland Mobilization of Cervical Spine on Pain Intensity and Functional Status in Patients of Cervical Radiculopathy: Cervical Spine on Pain Intensity and Functional Status in Patients of Cervical Radiculopathy. Pakistan BioMedical Journal. 2022 Jun 30:134-8.