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Comparison of Mulligan Traction and Neural Mobilizations in the Management of Pain in Patients with Cervical Radiculopathies; A Quasi-Experimental Study

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Author`s Contribution

[1-3]Conception and design, Collection and assembly of data, [4-6]Analysis and interpretation of the data,[3-5]Critical revision of the article for important intellectual content, 1Statistical expertise,[1-6]Final approval and guarantor of the article

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ABSTRACT

Objectives: To compare the effects of Mulligan manual traction and techniques in neural mobilization for managing pain in cervical radiculopathies.

Methodology: It was a quasi-experimental study at physical therapy departments of Amin Welfare & Teaching Hospital and Allama Iqbal Memorial Teaching Hospital Sialkot for 6 months from December 2018 to May 2019 after Ethical approval. The sample of 34 participants was equally divided into group A & B. Patients were recruited on the basis of pre-defined inclusion and exclusion criteria. Group A was administered mulligan traction. Group B received neural mobilization of ulnar, median and radial nerve thrice a week. Hot pack and TENS were applied as baseline treatment to both the groups. Numeric pain rating scale (NPRS) and neck disability index (NDI) were used to measure the outcomes and data was recorded before 1st treatment session and after last treatment session. P value ≤ 0.005 was considered as significant.

Results: Among the total of 34 sample size, 25 patients were females (73.52%) and 9 were males (26.47%). The mean Age±SD was 44.79±7.885 years. The mean NPRS score reduced from 8.18±0.809 to 3.12±1.269 (P=.000) in group A and from 7.47±1.007 to 2.76±1.147 (P=.004) in group B after treatment. Mean Score of NDI reduced to 4.78±1.23 from 16.00±1.71 (P=.000) in group A and 5.08±1.38 from 14.38±2.19 (P=.005).

Conclusion: The study revealed that mulligan manual traction and neural mobilization were effective for the pain management and improvement of functional abilities in patients with cervical radiculopathies; but none of them is superior to other.

Key words: Mulligan Manual Traction, Cervical Radiculopathy, neural mobilization, Numeric Pain Rating scale, Neck disability index.

Introduction

The incidence of neck pain is increasing day by day due to the use of technology at job-places and lack of physical activity. Women living in developed countries are more prone to develop neck pain than the women in underdeveloped countries.[1] The degeneration of the intervertebral disc results in hypomobility of neck, radiating pain to one or both upper extremities, tingling sensation and poor kinaesthetic sensation.[2] Sharp pain appears in nerve root distribution along with motor weakness in the muscles innervated by that particular nerve root.[3] Usually conservative treatment is the first line treatment for the management of the cervical radiculopathy and majority of patients shows improvement.[4]

Conservative treatment includes, patient education, posture re-education, action therapy, manual therapy and exercise therapy.[5] In manual therapy Mulligan's mobilization techniques to decrease pain and relieve symptoms are widely used.[6] In a recent study conducted in India, Mulligan spinal mobilization with arm movement in combination with conventional physiotherapy and neurodynamics was found effective in reducing pain, improving function and cervical ROM in subjects with cervical radiculopathy.[7] Neurodynamics or neural mobilization devised by Butler and Shacklock is another technique performed to relieve pain and improve functions.[8]

According to a randomized controlled trial on a sedentary population, cervical range of motion and pain is seen to be relieved more effectively by manual traction and mobilization along with the application of hot pack([9]). In a double blind randomized controlled trial conducted by Abdul Samad Khan et al, it was reported that Mulligan mobilization are more effective than Maitland mobilizations for the treatment of the cervical pain.[10] In Another RCT, Umar M, et al concluded that combination of cervical traction along with strengthening of the weak core muscles plays a vital role in the management of pain and dysfunction in patients with cervical radiculopathies.[11]

Although many studies are found in literature about comparison of different manual therapy interventions for the management of cervical radiculopathies. There is lack of well-designed studies to compare the effects of Mulligan manual traction and neural mobilization. The combined effect of Mulligan mobilization and manual traction along with neural mobilization has been studied previously in a study by S shafiq et al.[12] but it was unclear that which technique contributed in improving cervical ROM and decreasing pain. The purpose of this study was to compare the effects of mulligan manual traction and neural mobilization techniques for the management of pain in patients presenting with cervical radiculopathies.

Methodology

This was a quasi-experimental study conducted at physiotherapy departments of Amin welfare & teaching hospital and Allama Iqbal Memorial Teaching Hospital Sialkot, Pakistan. After Ethical approval by Sialkot College of Physical Therapy-Institutional Review Board, study was completed in 6 months from December 2018 to May 2019. The sample size was 34 or more patients calculated by the software (G-Power) with 80% power and 5% margin of error.12

Simple convenient, sampling technique was used to recruit the participants. Patients with confirm diagnosis of cervical radiculopathy referred from orthopedic and neurology department were screened for the eligibility criteria. Patients of age 30-60 years of either gender having cervical radiculopathy for more than 4 weeks were included and patients with any malignancy, congenital diseases of cervical spine, history of trauma, and rheumatoid arthritis were excluded from the study. Written informed consent was obtained from all the participants. Numeric pain rating scale and NDI were used to measure pain and disability. Patients were equally divided in two groups A and group B.

In group A mulligan traction was administered.[13] The patient was positioned supine on a comfortable couch and physiotherapist took position on the head end of the patient in walk standing. Physiotherapist placed the mobilization belt around her shoulder girdle and crossed at the level of wrist, while placing the middle finger within the belt with her arms in front of her body, shoulder flexed and abducted, elbows extended, forearms supinated, wrists extended and fingers flexed. Then she placed her hands positioned in the belt below the cervical spine of the patient. While transferring her weight from front leg to back leg, a gentle traction was applied to the target spinal segments. Traction was sustained for 20 seconds and relaxed for 10 seconds, 3 repetitions per session. The technique was administered by a senior physiotherapist who is a certified Mulligan practitioner (CMP).

In group B neural mobilization of ulnar, median and radial nerve was administered with 10 repetitions in each session.Treatment was administered on alternate days.[14] The steps involved in neural mobilization are as follows;

Radial Nerve: Patient lying supine at the edge of the couch on the side of symptoms. Shoulder 60º abducted and internally rotated as much as possible, scapula stabilized to avoid the elevation, elbow extended, forearm pronated, wrist flexed and deviated to ulnar side, fingers flexed and neck sideflexed and rotated to opposite side. While physiotherapist standing on the same side stabilizing the scapula with right hand and positioning rest of the limb with left hand and used support of her thigh to complete the technique.

Median Nerve: The patient is positioned supine on a couch of approprite height. Patients left shoulder (test side) is depressed and abducted to 90°, laterally rotated, elbow flexed to 90°and forearm supinated. The physiotherapist stands on the left side of the patient with her elbow right flexed and depressing the pateint's shoulder.She holds the patient's hand which is extended at wrist, metacarpofalangeal and interflangeal joints with her right hand.Patient's Elbow is than extended along with side flexion of the neck to opposite side, simultaneously physiotherapist manages her own body position and ergonomics.

Ulnar Nerve: For a left side of application of technique, the patient is positioned supine, Physiotherapist stands on same side facing towards the patient, places her hand below patients scapula and holdsthe top of shoulder. Shoulder abducted 90º and externally rotated, elbow flexed 90º, gripping the patients hand by left hand of physiotherpist, wrist exteded, fingers extended. Then maintaining the position, elbow is further flexed, shoulder abducted as much as possible while the flexed elbow of thepatient is supported at the right anterior superior illiac spine of the therapist.The techniques were applied by an experienced physiotherapist.There were total for 12 sessions for each patient in 4 weeks.Hot packs and TENS were applied on cervical region, as baseline treatment to both the groups.Treatment was administered on alternate days each week. Outcome measures were assessed at baseline and after 4 weeks of treatment.

Data was analyzed by 21st version of SPSS. Shapiro-wilk's test was applied to find out the normality of data ($p \geq 0.05$) and data was found normally distributed, so parametric tests were opted to calculate further results. The independent sample T-test and paired sample-T test were applied to compare within groups changes and the difference in the NPRS Scores and NDI score and, P value ≤ 0.005 was considered as significant.

Results

The mean age ± standard deviation of the participants was 44.79±7.885 years. Out of 34 subjects 13 (33.87%) had symptom on right side while 21 (66.13%) had on left side. Among the total of 34 patients, 25 patients were females (73.52%) and 9 were males (26.47%). Out of them 5 (14.70%) were male and 12(35.29%) were females in group A, while in group B 4 (11.76%) were male and 13(38.23%) were females. The mean NPRS score before treatment was 8.18±0.809 in group A and 7.47±1.007 in group B. The results of comparison of the mean value of pain (group A and B) and NDI using Independent sample t test are expressed as Table I.

There was appreciable difference between the mean scores of NPRS and NDI before the treatment and after the treatment in both group A and B (table II).The difference in the NPRS scores and NDI scores both for Group B was lesser than that in Group A which represents that neural mobilization more effectively decreased the pain. The pain association between the gender and the value of mean for pain in females is higher in both the groups A and B (Table III).

Discussion

Table I: Independent Samples T-Test (Pre- Treatment) Intra Group Comparison of Pain.

	Gender	NPRS Score Mean±SD	P value
Comparison of Pain and gender (Group A)	Males (N= 5)	7.80 ±0.447	0.226
	Females (N=12)	8.33 ± 0.888	
Comparison of Pain and gender (Group B)	Males (N=4)	7.25 ±0.957	0.632
	Females (N=13)	7.54 ±1.050	

Table II: Paired Sample T Test for comparison (Within Group) of NPRS Scores

Outcome variables	Study Group	Pre treatment	Post treatment	P-Value
NPRS* Score	Group A	8.18 ±0.809	3.12±1.269	0.000
	Group B	7.47±1.007	2.76±1.147	0.004
NDI ** Score	Group A	16.00±1.701	4.78±1.237	0.000
	Group B	14.378±2.109	5.08±1.378	0.005

*NPRS: numeric pain rating scale.
**NDI: neck disability index.

Table III: Independent Samples T Test (Between Groups analysis).

Outcome variable and its measurement		Groups	Outcome Scores (Mean±SD)	P-Value
NPRS Score	Pre-treatment	Group A	8.18±0.809	0.031
		Group B	7.47± 1.007	
	Post-treatment	Group A	3.12±1.269	0.226
		Group B	2.76±1.147	
NDI Score	Pre-treatment	Group A	16.00±1.701	0.002
		Group B	14.37±2.109	
	Post-treatment	Group A	4.78±1.237	0.018
		Group B	5.08±1.378	

This study aimed to compare the effectiveness of mulligan mobilization with neural mobilization in patients with cervical radiculopathy. The results depicted that both the techniques are effective in reducing pain in subjects with cervical radiculopathy.

In a recent RCT published in 2021, Savva C.et al compared the cervical traction combined with neural mobilizations in patients with cervical radiculopathy in double blind placebo controlled RCT on 66 patients. They used NDI, NPRS, Hand grip strength, patient specific functional scale and cervical spine mobility as outcome measurement tools at baseline and four weeks follow ups. They observed statistical and clinical significance and found that combination of two techniques produced within group improvements, while no significant difference was observed in placebo groups.[15] The results of this study support our study outcome, while the difference of study design and variety of outcome measurement tools makes it much stronger than ours.

Furqan Hassan et al 2020 compared the effects of Maitland and Kaltenborn techniques in the management of cervical radiculopathy in an RCT on 46 patients in Pakistan. They measured outcomes by using NPRS, NDI and cervical ROM by Goniometry. They found that both the techniques were effective in controlling the pain, ROM and disability, however Maitland techniques were more effective.[16] While we also used NPRS and NDI to find the outcomes and compared Mulligan traction technique and neurodynamics in the management of pain in cervical radiculopathy.

The result of our study showed that mulligan traction and the neural mobilization both are effective in relieving pain is similar to the results of research reported in 2015 by Anand Kumar, they found that combination of SNAG and neurodynamics was effective in pain relief. Neural mobilization along with SNAGS showed immediate decrease in the pain, increase in the cervical motion and improvements in the functional status[17] however they used combination of both techniques but we have observed individual effects of these two techniques.

Our study revealed that mulligan traction is effective in reducing the pain of cervical radiculopathy which is consistent with the study conducted by Bosmia et al 2015; their results showed that mulligan traction can be considered as a treatment for cervical radiculopathies.[18] Mobilization of nerve shows useful results as compared to the mulligan mobilization in improving dysfunction and pain.[19] Some studies suggest, both MWM and neural mobilization shows better results in improving pain and the functional ability of the patient.[20]

Abdus Samad Khan et al 2017 compared the combination of neural flossing with Mulligan mobilizations and with Maitland's mobilization individually. They conducted a double blind RCT with a sample of sixty subjects. They found that neurodynamics combined with Mulligan's mobilization technique are more effective in treating cervical radicular pain[10] while the differences with our study are; they worked on a larger sample and used the mobilization techniques while, we utilized the Mulligan traction technique and neurodynamics separately on a smaller sample size without randomization.

Anwar S and co-authors 2015 found that neurodynamic techniques were effective in managing pain, personal care, reading, headache, driving, sleeping, recreation and work measured via neck disability index and VAS in small scale RCT; while we considered two techniques in this non randomised study design.[21] Pain relief with mulligan traction along with neural flossing matched with study held in 2013 which concluded that there is marked reduction in pain and neck dysfunction with cervical traction along with neurodynamics.[22]

Although our study could not find any statistically significant difference of the outcomes of both the techniques, but there was clinically significant difference in terms of pain management and improving the neck disability. The limitations of our study were a smaller sample size, only two study settings in a single city, and there was unequal gender distribution in both the groups leading towards majority of females in both the groups. Future studies may be designed with larger sample size, blind study design and multiple recruitment centres to produce more generalizable results.

Conclusion

The study concludes that neural mobilization techniques and mulligan traction may benefit the management of pain and disability in patients with cervical radiculopathies; but none of these is superior to other.

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