

Efficacy of Neural Mobilization and Cervical Stabilization in Cervicobrachial Pain: A Randomized Controlled Trial

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Abstract

Objective: To analyze the efficacy of neural mobilization technique in cervicobrachial pain. To analyze the efficacy of cervical stabilization exercise in cervicobrachial pain

Background of the Study: Cervical radiculopathy is a pathological process of involving the cervical nerve root as a result of compression and inflammation of the nerve root near the cervical neural foramen. Cervicobrachial pain syndrome is term that describes pain and stiffness of the cervical spine with symptoms in the shoulder girdle and upper extremity.

Methodology: This was conducted in the Outpatients Physiotherapy department in ACS medical college and hospitals. Group A Received Neural mobilization technique and Group B Cervical stabilization exercise for 12 weeks. Pre and post-test taken by using primary outcome measure such as Pain DETECT Questionnaire, Disability of arm shoulder and hand DASH Questionnaire, Fear avoidance beliefs Questionnaire and cervical ROM.

Results: The comparison revealed that neural mobilization group A had a great increase in cervical range of motion flexion and extension ($P \leq 0.001$), Decreasing pain intensity ($P \leq 0.001$) and also shows significant decrease in the neural mobilization ($P \leq 0.001$) than the cervical stabilization exercise. The significant difference between Group A seems to be more effective than Group B.

Keywords: Cervicobrachial pain, neural mobilization, cervical stabilization exercise, Fear avoidance beliefs questionnaire, Disability of arm, shoulder and hand dash.

Introduction

Cervicobrachial pain (CP) is defined as the presence of upper-quadrant pain associated with cervical spine pain. CP can therefore be referred to the arm from somatic structures or radiate to the upper limb through

neuropathic mechanisms. Numerous classifications have been reported, including cervicobrachial pain syndrome, cervical radiculopathy and neck and arm pain. For this study, CP is defined as “the presence of arm pain associated with cervical spine pain” as described by Salt et al¹

Reddy et al states that Cervical spondylosis is a common degenerative condition of the cervical spine in the general population with incidence rate of 83 per 100,000 populations and prevalence of 3.3 cases per 1000 people and occurs mostly in fourth and fifth decades of life.²

Basson et al concludes that Neck pain is often associated with headache upper back and shoulder arm pain and cervical radiculopathy. Diagnosis of

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cervicobrachial pain is made by a clinical process and there is often no overt neural involvement can be assumed if a cluster of clinical finding is present such as an active and passive movement dysfunction, adverse response to neurodynamic testing and evidence of local cause of neuropathic pain.³

Pierre Langevin et al states Cervical radiculopathy (CR) is an important subgroup of neck disorders. Although less prevalent than mechanical neck pain, CR leads to more severe pain and disability. In fact, individuals with combined axial and radicular symptoms have been shown to present higher functional limitations than those with either isolated axial or radicular pain.⁴

Schoenfeld AJ et al states Cervical radiculopathy was 107.3 per 100,000 for men and 63.5 per 100,000 for women. A more recent study from the US military found an incidence of 1.79 per 1000 person-year (50-54 years) the incidence of cervical radiculopathy seems to peak in the fourth and fifth decades in life.⁵

Levels of involvement is most typically the C7 (39.3%-46.3%) and C6 (17.6%- 42.6%) nerve roots. Bilateral involvement is reported in 5-36% of cases. The inter vertebral disc has been found to be causative in only 22% of cases, while 68% of cases appear to arise from a combination of discogenic and spondylotic causes. Cervical radiculopathy is one of the most health-related complaint. Cervical radiculopathy is common clinical diagnosis classified as a disorder of a nerve root and most often is a compression or inflammatory pathology from a space occupying lesion such as spondylotic spur, disc herniation as explained by Rajalaxmi et al.⁶

Sharma et al states Neural mobilization can be used for both evaluation and treatment purposes, when it is used in the treatment; its main purpose is to reestablish the dynamic equilibrium of the neural tissues, normalizing its physiologic function. The nervous system can be effectively and safely mobilized, the ultimate aim of treatment is to restore the patient's range of nervous system movement & stretch capabilities and to normalize the sensitivity of the system.⁷

Apoorva Sunil Likhite et al states the neurodynamic provocative tests used for the upper quadrant disorders, Upper Limb Neurodynamic Test 1 (ULNT-1) is reported to be evaluating most roots of brachial plexus and nerves of upper limb, with more emphasis on the median nerve.⁸

Rodríguez-Sanz D reports that The median nerve

neural mobilization (MNNM) and relieve CP, but through different mechanism and with a different onset of side effects MNNM is a specific physical therapy technique for the treatment of CP described by Butler, Coppieters, and Elvery –hall that achieves pain relief through mechanical stimulation of the median nerve and the brachial plexus.⁹

Jinyeol Jeon et al argues The recent therapeutic exercise there is increasing interest in, understanding the effect of cervical stabilizing exercise, not only to prevent neck disorder, but also reduce chronic cervical pain. These exercises induced cervical vertebra to maintain a neutral position by strengthening the deep muscles play a major role in maintaining spinal stability. Patient with cervical pain show reduced strength and endurance in deep muscles, as well as ability to retract the lower jaw compared to normal people, according to many studies. Moreover, there is a report there is report that stabilizing exercise is very effective at reduce chronic cervical pain and improving neck function.¹⁰

Gummeson et al reports The 30-items disabilities of the arm, shoulder and hand (DASH) questionnaire which has been assessed recording reliability, cross-sectional validity and longitudinal validity in a variety of arm disorders.¹¹

Padua R et al states that The FABQ2 (Fear avoidance beliefs about physical activity) showed little or relationship with VAS ($p = 0.26$, $p < 0.001$). The coefficient of $r = 0.808$ was estimated for the total questionnaire as an indicator of excellent reliability of the Persian FABQ.^{12,13}

Sunnia Chandan et al reports that the pain DETECT questionnaire (PDQ) is one of the screening tools of neuropathic pain, which was published by Freynhagen et al., from Germany they established the usefulness and validity of this brief, self-administered questionnaire in identifying neuropathic components of pain in patients with chronic lower back pain.¹⁴ The use of these tools in different language and cultures could contribute to increase the recognition of neuropathic pain.¹⁵

Materials and Method

This was a comparative study with pre-post type. This was conducted in the Outpatients Physiotherapy department in ACS medical college and hospitals and took nearly 3 months to complete the study (January 2019-April 2019). 30 samples were selected from 40

volunteers based on the inclusion and exclusion criteria, Cervicobrachial pain of both gender aged between 30 to 60 years. Sufficient cooperation and to participate and able to communicate and follow the instructions and able to perform Neural mobilization and Cervical stabilization exercise according to Cervicogenic pain, Arm and hand pain, Neck distraction, Upper limb tension test, non-traumatic pain, Involved side cervical rotation less than 60 degree ROM and excluded those with Negative neurodynamic test, Neck and upper extremity surgery, Medical red flag suggesting a non-musculoskeletal origin, Vertebral instability, Vertebral spine infection, Neurological disease of genetic, infection, or neoplastic origin, Inflammatory or systemic disease, VBI symptoms, Rheumatoid arthritis.

Once the study gets approved from Institutional Review Board 30 samples were divided into two groups by random sampling method. The samples will be fully explained about the study and the questionnaire to be filled. They were then asked to fill the constant form it acceptance to participate in study, which is duly signed by the samples and therapist. Initially demographic details like age, gender, height, weight were collected assuring confidentiality of the same. Group A Received Neural mobilization technique and Group B Cervical

stabilization exercises for 5 repetition/one sessions per day for 4 days a week for 12 weeks. Pre and post-test taken and before and after the study of 3 months, by using primary outcome measure such as Pain DETECT Questionnaire, Disability of arm shoulder and hand DASH Questionnaire, Fear avoidance beliefs Questionnaire and cervical ROM.

Data Analysis: The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups.

Demographic Data:

Table-1

Variables	Group-A Mean + SD	Group-B Mean + SD
Age	49.00 + 9.77	51.33 + 10.84
Height	159.24 + 7.63	156.75 + 9.08
Weight	67.60 + 12.96	73.80 + 10.96

Table 2: Comparison of Dependent Variables within Group – A Between Pre & Post Test Values

Variables	Pre Test		Post Test		t - Test	Significance
	Mean	S.D	Mean	S.D		
DASH	75.26	6.57	49.86	8.76	14.88	.000***
FABQ	41.26	2.54	21.23	2.29	29.21	.000***
PDQ	27.73	2.31	17.00	2.42	16.13	.000***
CROM (F)	21.00	5.41	37.66	5.30	-.959	.000***
CROM (E)	21.66	4.08	38.66	5.16	-14.46	.000***

(***- P ≤ 0.001)

Table 3 Comparison of Dependent Variables within Group – B Between Pre & Post Test Values

Variables	Pre Test		Post Test		t – Test	Significance
	Mean	S.D	Mean	S.D		
DASH	75.93	5.48	71.66	5.16	4.64	.000***
FABQ	41.33	2.89	37.78	3.10	11.78	.000***
PDQ	28.06	2.71	25.06	2.68	8.04	.000***
CROM(F)	21.66	5.87	29.00	.632	2.30	.000***
CROM(E)	22.33	4.16	29.66	3.99	3.34	.000***

(***- P ≤ 0.001)

Results

On comparing the Mean values of Group A & Group B on Disability Arm Shoulder and Hand Questionnaire Score, both the groups showed significant decrease in the post test Mean values but (Group A - Neural Mobilization) shows **49.86** which has the Lower Mean value is effective than (Group B -Cervical Stabilization Exercises) **71.66** at **P ≤ 0.001**.

On comparing the Mean values of Group A & Group B on Fear Avoidance Belief Questionnaire Score, both the groups showed significant decrease in the post test Mean values but (Group A - Neural Mobilization) shows **21.23** which has the Lower Mean value is effective than (Group B -Cervical Stabilization Exercises) **37.73** at **P ≤ 0.001**.

On comparing the Mean values of Group A & Group B on Pain Detecting Questionnaire Score, both the groups showed significant decrease in the post test Mean values but (Group A - Neural Mobilization) shows **17.00** which has the Lower Mean value is effective than (Group B -Cervical Stabilization Exercises) **25.06** at **P ≤ 0.001**.

On comparing the Mean values of Group A & Group B on cervical range of motion (Flexion & Extension), both the groups showed significant increase in the post test Mean values but (Group A - Neural Mobilization) shows **37.6 & 38.6** degrees which has the Higher Mean value is effective than (Group B -Cervical Stabilization Exercises) **29.0 & 29.6** at **P ≤ 0.001**.

On comparing Pre-test and Post-test within Group A & Group B on DASH, Fear Avoidance Belief Questionnaire, Pain Detecting Questionnaire and Cervical Range of Motion (Flexion & Extension) showed highly significant difference in Mean values at **P ≤ 0.001**

Discussion

The present study was concluded to determine the effectiveness of neural mobilization and cervical stabilization exercise in cervicobrachial pain. About 30 subjects were selected. The 30 subjects were selected into group A 15 and group B 15. Group A Received Neural mobilization technique and Group B Cervical stabilization exercise for 5 repetition/one sessions per day for 4 days a week for 12 weeks of treatment. It was noticed that there was improvement the above parameters in all the two groups. In many studies it has

been proved that neural mobilization technique has the greater impact on decrease in pain, strengthening of muscle and increasing in range of motion.

The statistical reports reveal that there is no significant difference in pre-test values of PDQ, FABQ, DASH and GONIOMETER ROM score in group A and group B. But there is statistically highly significant difference in post-test values of PDQ, FABQ, DASH and GONIOMETER ROM score in group A and group B. Both the groups show significant decrease in the post test values group A is more effective than group B. this shows both groups are significant in reducing pain, increasing in range of motion in cervicobrachial pain but Group A (neural mobilization technique) is more significant when compared to group b (cervical stabilization exercise).

Neural mobilization is used to affect the neural structures in conditions with signs of neural involvement or neural mechano sensitivity. It is said to have an impact on the axoplasmic flow, movement of the nerve and its connective tissue, the circulation of the nerve by alteration of the pressure in the nervous system, Dispersion of the intraneural oedema and can also decrease the excitability of dorsal horn cells.

Anupama prabhu et al (2017) The study aimed at VT for median nerve was reduced for the intervention group and for ulnar nerve it was reduced in both the groups with the mobilization of the neural tissue, there could be a better reception and faster conduction of these impulses and hence, increase in sensitivity of the nerve and reduction in pressure.⁸

Kikukawa et al (2003) reported that microtubules were depolymerized by stretching, which can affect axonal transport. When nerve fascicles are stretched, its cross-sectional area is reduced interfascicular pressure increase, nerve fibers are compressed and microcirculation is compromised and pressure received by nerve will affect the edema and demyelination.^{14,15}

Rajalaxmi Gopala Krishnan al (2015) Suggested that the patients who meet the diagnostic classification for cervical radiculopathy might benefit from a multimodal treatment that includes interferential therapy, neural mobilization and conventional therapy. Rather it involves all the surrounding nerves and tissues whereas neural tissue mobilization specifically targeted the neural structure involved.⁶

The present study attempts to identify the efficacy of two active manual therapy techniques in case of subject with cervicobrachial pain syndrome. One technique followed the principles of neural mobilization technique by utilizing neural tissue mobilization for median and radial nerve and other technique focused on cervical stabilization exercise. The study revealed that each of the approach (neural tissue mobilization and cervical stabilization) resulted in overall improvement in disability and pain but the neural tissue mobilization is more effective than the cervical stabilization.

Conclusion

This study confirmed that neural mobilization technique had better carryover effect as compared to cervical stabilization exercise and also it showed steady improvement in the pain and disability so subjects showed much faster improvement. That neural tissue mobilization for median and radial nerve as a treatment technique is much more effective than cervical stabilization exercise, thus the neural mobilization technique is effective in regard to increasing function as well as active ROM, while decreasing level of cervicobrachial pain and disability.

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