Effects of neural mobilization with or without soft tissue mobilization in cervical radiculopathy: A randomized control trial

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Abstract

Objective: To determine the effect of neural mobilization with or without soft tissue mobilization in cervical radiculopathy on pain scale

Methods: RCT was conducted at physical therapy Department of IIRS Isra University, Islamabad Campus and Department of Physiotherapy Benazir Bhutto Hospital Rawalpindi. 30 patients of age 18 to 55 year with spurling's test positive and had radiating pain in one of the upper limbs more than 3 months were selected randomly from general population. Participants were randomly divided into two groups; each with 15 participants through lottery method. The experimental group I received cervical traction, hot pack, neural mobilization techniques and post isometric relaxation techniques. The experimental group II received cervical traction, hot pack and neural mobilization techniques. General health was assessed at the start of study through self-structured questionnaire; it included working hours in a day, how much time participant spend on gadgets, participant feeling difficulty during using gadgets etc. Data was compared at baseline and during and after the intervention. Intervention-induced changes within the groups were investigated using paired sample t-test while independent sample t-test was used to compare the two groups.

Results: Study population included 6 males and 54 females. Mean age of experimental group 1 and experimental group 2 was 37.2 SD ± 9.2. Mean body mass Index of group 1 and group 2 was 2.8 SD ± .69. Mean of working hours in a day of group 1 and 2 was 7.0 with SD ± 2.3. Mean of how much time participant spend on gadgets (minutes) of experimental group 1 and 2 was 99.9 SD ± 108.4. Mean of participant feeling difficulty during using gadgets of experimental group 1 and 2 was 1.4 with SD ± 0.5. NPRS results show that there is statistically significant ($p<0.05$) difference within and between groups at end of session.

Conclusion: Neural mobilization with soft tissue mobilization is significantly more effective than neural mobilization without soft tissue mobilization for the treatment of cervical radiculopathy.

Indexed terms_ Neural mobilization, soft tissue mobilization and cervical radiculopathy

I. Introduction

Cervical Radiculopathy is a peripheral nervous system disorder, that usually affect normal ADL's of an individual along with chronic neck pain and cervical nerve root normal functioning.[1-5] 83 cases out of every 100,000 people in the population reported as an annual preference along with prevalence increases with fourth to sixth decade of life.[6-8] Several radiological studies reported that lesions that are most common either leads to compression of nerve root or inflammation includes osteophytic encroachment and cervical disc herniation.[3, 5, 9] If lesions occurs, sensory or motor cervical nerve root fibers may be affected, resulting in neurological symptoms such as shooting, burning, sharp pain, electric-shock, sensory (numbness or paresthesia), motor (loss of active movements/ muscle weakness) signs in both or one of the upper limb.[1 , 6-10] Incidence of cervical radiculopathy related to trauma is low. Other factors supposedly are heavyweight lifting, prior lumbar radiculopathy and playing golf. [11] Although, Magnetic Resonance Imaging (MRI) and Electro-diagnostic studies are not feasible in clinical practice but still they are used as a confirmation of Cervical Radiculopathy (CR) [4, 7, 12] New technique named Neural Mobilization was introduced for about more than 25 years to treat Cervical Radiculopathy pain. This technique assist mechanoreceptor and also facilitates nerve gliding which describes sliding at Involved CNRs.[13, 14, 15] Neural mobilization plays integral role in promoting elasticity / flexibility and return to function. The technique reduces the compression on the neural tissue, motor unit recruitment is enhanced and thus the muscle strength. Intensity of pain and related symptoms are also improved by neural mobilization. [16] Soft tissue mobilization (STM) uses specific, graded and progressive application of force by the use of physiological, accessory or combined techniques either to promote collagen synthesis, orientation and bonding in the early stages of the healing process, or to promote changes in the viscoelastic response of the tissue in the later stages of healing. [17] There is significant evidence that cervical neuropathy patients are benefitted by soft tissue techniques along with carpal tunnel syndrome. [18, 19, ,20] According to Burke et al patients of carpal tunnel syndrome can be treated with two different soft tissue mobilization techniques which were designed to address soft tissue restriction in the forearm and hand. Manually applied and instrument assisted both the STM technique showed clinical betterment which include lessened pain, ROM nerve conduction latencies, and improved function. [21] Variety of interventions are proposed to be effective in cervical

radiculopathy including cervical traction, therapeutic modalities, manipulation / mobilizations but no study has compared effects of neural mobilization and soft tissue mobilization in cervical radiculopathy. [22]

II. Patients and Methods

A randomized control trail was conducted after approval from advanced study & research committee (ASRC) of Isra institute of rehabilitation sciences, Isra University Islamabad. It was conducted on the general population of Isra Institute of Rehabilitation Sciences, Isra University, Islamabad Campus and Benazir Bhutto Hospital Rawalpindi. The total number of participants included in the study was 60 selected through Non probability Convenience Sampling and randomly assigned to experimental group 1 and experimental group 2, resulting in 30 participants in each group. Lottery method was used for randomization. Inclusion criteria were participants with age 18 to 55 years having radiating pain in one of the upper limb for more than three months and spurling's test in sitting position. Individuals with traumatic injury of upper limb or cervical spine, vertebral artery test positive, asymptomatic for pain but symptomatic for tingling or paraesthesia, any circulatory disturbance of upper extremity, thoracic outlet syndrome and known history of high level of spinal cord injury and malignancy were excluded from the study. Initially physiotherapist assessed the general physical health of both groups (i.e height, weight, BMI, ROM, MMT etc)

The intervention included experimental group 1 was cervical traction for 10minutes 7% of body weight with 7 seconds hold time and 5 seconds rest time, hot pack for 10minutes, Neural mobilization technique includes median , radial and ulnar nerve mobilization. Frequency for neural mobilization is 3 sets of 10 repetitions for each and duration of 10 minutes. The treatment sequence for the above mentioned nerves are: **a**) Median nerve: Glenohumeral abduction, wrist extension, supination, glenohumeral lateral rotation, elbow extension, neck lateral bending to opposite side. **b**) Radial nerve: Glenohumeral depression, elbow extension, whole arm internal rotation, wrist flexion. **c**) Ulnar nerve: Wrist extension,forearm pronation, elbow flexion, glenohumeral lateral rotation, glenohumeral depression, shoulder abduction. Post isometric relaxation technique. The post-isometric relaxation (PIR) technique begins by placing the muscle in a stretched position. Then an isometric contraction is exerted against minimal resistance. Relaxation and then gentle stretch follow as the muscle releases. Frequency for PIR is 3 sets of 5 repetitions and duration of 10 minute.

Participant will be scheduled to attend 12 treatment sessions (3 sessions every week for 4 weeks, 40 mints each session). Experimental group II Base line treatment remains the same as mentioned in group 1 i.e cervical traction, hot packs and neural mobilizations. Data was compared at baseline, 1st week, 2nd week, 3rd week and 4th week. Data was analyzed by SPSS version 17. Categorical variables and demographic feature of subjects were presented as means of percentages and frequencies. The changes within the groups were analyzed by paired sample t-test and differences between the groups were by independent sample t-test.

Data was collected through following questionnaires

PATIENT PROFORMA

Demographics

Patient Name: _____Patient ID: _____Group_____ Contact #_____

Age								
Gender	**Male**					**Female**		
BMI	**Weight:**		**Height:**			**BMI:**		
Comorbidities								
Occupation								
Working hours in a day								
Right-handed or left-handed			**Pain radiated to right or left side of arm?**					
Sleeping hours in a day?			**What type of pillow you like to use?**			**Custom made**		**Handmade**
Do you use any medicine?	**Yes**	**No**	**If yes than mention the drug names.**			**Do you smoke? If yes than mention no. of packs.**		
How much time you spend on computer and mobile?			**Do you have difficulty during use of computer and mobile?**			**Yes**		**No**

If yes than after how long you feel difficulty?		**RAPA**	**Yes**	**No**

Numeric Pain Rating Scale (NPRS)

Neck Pain Numeric Scale (NPRS): 0 to 10, 0=No pain 5=moderate pain 10=Worst pain Imaginable

	First Week		**Second Week**		**Third Week**		**Fourth Week**	
Neck Pain Numeric Scale (NPRS)	**1st day**	**3rd day**	**4th day**	**6th day**	**7th day**	**9th day**	**10th day**	**12th day**
1. On a scale of 0 to 10, with 0 being no pain at all and 10 being the worst pain imaginable, how would you rate your pain RIGHT NOW.								

III. Results

There were 60 patients in this study. Study population included 6 males and 54 females. Mean age of experimental group 1 and experimental group 2 was 37.2, SD ± 9.2. Mean body mass Index of experimental group 1 and 2 was 2.8, SD ± 0.6. Mean of working hours in a day of experimental group 1 and experimental group 2 was 7.01, SD ± 2.3. Mean of how much time participant spend on gadgets (minutes) of experimental group 1 and 2 was 99.9, SD ± 108.4. Mean of participant feeling difficulty during using gadgets of experimental group 1 and experimental group 2 was 1.46 with SD ± 0.5.

Table 1.1 shows between group comparison from baseline till terminal session. Significant improvement was seen at 1st (0.05), 2nd (0.05) and at terminal /4th session (0.00) in group 1 as mean was also improved from 8.4 ± 1.0 to 1.2 ± 1.1.

Table: 1.1 Comparison of NPRS Between the groups

	Participant Group	N	Mean	Std. Deviation	P-value
NPRS Base Line Data	exp1	30	8.433	1.0063	0.7
	exp2	29	8.345	.8140	
NPRS 1st Week	exp1	27	5.704	1.2346	0.05
	exp2	27	6.333	1.0742	
NPRS 2nd Week	exp1	24	2.875	1.4238	0.05
	exp2	26	3.731	1.6385	
NPRS 3rd Week	exp1	27	2.333	1.3301	0.06
	exp2	27	3.185	1.9422	
NPRS 4th Week	exp1	28	1.250	1.1097	0.00
	exp2	24	2.500	1.7446	

Table: IV.11 NPRS Comparison within the groups

	NPRS	**Mean**	**Std. Deviation**	**P- Value**		**Mean**	**Std. Deviation**	**P- Value**

EXP 1	NPRS Base Line Data	8.421	.9016	.000	**EXP 2**	8.250	.7372	.000
	NPRS 1st Week	5.579	1.2164	.000		6.250	1.0321	.000
	NPRS 2nd Week	2.842	1.3443			3.542	1.5598	
	NPRS 3rd Week	2.316	1.3355	.138		2.875	1.8013	.358
	NPRS 4th Week	1.421	1.1213	.006		2.375	1.6632	.074
				.000				.000

Within group 1 comparison shows significant improvement at all sessions except 2nd week. Within group 2 comparison shows significant improvement at first week (0.00) and at4th week (0.00). No significant improvement was seen at 2nd & 3rd week.

IV. Discussion

As a clinical syndrome cervical radiculopathy in the neck manifest itself as by compressing spinal nerve. Pain, weakness in the upper extremity, pain in neck and in the upper extremity sensorimotor deficits in the area of distribution of affected nerve are the typical characteristics of this syndrome. Due to these symptoms affected persons are unable to person their social, mental and physical activities efficiently. [23]

In a RCT study of Shazia Rafique et al, effectiveness of neural mobilization on pain, ROM and disability in cervical radiculopathy. The study concluded that conservative treatment and neural mobilization both treatment protocol are beneficial for cervical radiculopathy. In present study, comparison of NPRS between experimental group 1 and experimental group II has shown significant improvement ($p>0.05$). The results of this study are in consistent with the literature that shows neural mobilization is effective for the management of cervical radiculopathy in terms of reducing pain and improving functional status. [24]

Kim and colleagues conducted a study on the effect of neural mobilization on C.R patients pain, disability, ROM and deep flexor endurance. Results showed that NPRS and neck disability index are more decreased and ROM, deep flexor endurance is more enhanced in neural mobilization with manual traction. [25]

Robert and Butler did comparison on mobilization with movement (MWM) & MWM with neural mobilization. Results showed significant improvement in later group as MWM works in one direction and neural mobilization enhances movement due to stress, strain in non-uniform pattern. [26]

Similarly current study results showed within group significant improvement ($p= 0.00$) in participants receiving neural mobilization along with soft tissue mobilization and neural mobilization alone. But significant improvement has seen in neural mobilization along with neural mobilization.

V. Conclusion

Between group comparison showed significant improvement ($p = 0.00$) by neural mobilization along with soft tissue mobilization. Within group result s showed significant improvement ($p = 0.00$) in both groups neural mobilization along with soft tissue mobilization and neural mobilization alone.

Acknowledgement: We are grateful to Benazir Bhutto Hospital, Rawalpindi for allowing us for data collection and providing necessary help

Conflict of Interest: None

Source of Funding: None

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