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ORIGINAL ARTICLE

Comparison of Short-Term Effects of Thrust Manipulation and Non-Thrust Mobilization at Cervicothoracic Junction in Mechanical Neck Pain

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ABSTRACT

Objective: The objective of this study was to compare the effects of thrust manipulation and non-thrust mobilization at cervicothoracic junction in patients with mechanical neck pain.

Methodology: The study design used was a Quasi-Experimental Trial conducted at Riphah Rehabilitation Center, Lahore. A sample size of 80 patients was taken using the non-probability convenient sampling technique. Patients were divided into two groups; group A was treated with Thrust manipulation while group B was treated with non-thrust mobilization at the cervicothoracic junction. The numeric pain rating scale (NPRS) and Universal Goniometer for Pain and Active Cervical Range of Motions (ACROM) were used. Patients were assessed at baseline (Pre-treatment), after the first treatment session (T1) and after the second treatment session (T2) after 48 hours. Data were analyzed by using SPSS 25.

Results: Both groups showed significant improvement in pain and cervical range of motion. p-value of NPRS across the groups at pre-treatment time was p =0.86 and there was a significant difference at T1 & T2 with a p-value <0.05. The p-value for all cervical range of motions across the groups at pre-treatment time was > 0.05 and at post-treatment T1 & T2, all movements showed significant improvement in ROM with a p-value < 0.05.

Conclusion: The study concludes that patients who received thrust manipulation at the cervicothoracic junction showed more significant short-term improvements in Pain and cervical range of motion than those who received non-thrust mobilization.

Key Words: Neck Pain, Manipulation, Range of Motion, Vertebrae.

INTRODUCTION

Neck pain is the second most common musculoskeletal complaint in the working and general population and the leading cause of disability (1-3). The estimated prevalence of neck pain is to be 30-50% (3). Mechanical neck pain remains restrained to the cervical, occipital, or posterior scapular regions and does not radiate into the upper limbs. Most often, a rigorous headache that may spread out to occipital, temporal or periorbital areas may be associated with mechanical neck pain(4). Mechanical neck pain is defined as a pain that arises or exaggerates by the cervical spine's movement or palpation of muscle in the cervical region or cervicothoracic junction(1, 5-7). Neck pain appears as presenting complaint in about one-quarter of all the patients in an outpatient physiotherapy center(8). Cervical and thoracic spines are strongly associated biomechanically so that the cervicothoracic junction may contribute to mechanical neck pain(9). During active cervical movement, high interregional coordination present between the cervical and thoracic region(10). The cervicothoracic junction is the potential region to develop stiffness. Neck pain is associated with the altered movement pattern appellation as inverse C7-T1 relationship. In neck pain, mobilization at the cervicothoracic junction has been deemed safe(11).

Manual therapy is a frequent intervention preferred by physiotherapists to treat mechanical neck pain, which is anticipated to decrease Pain, mobilize or manipulate joints and soft tissues, and enhance tissue pliability and motion range (1, 12). Mobilization is termed as low velocity, either small or large amplitude passive movement applied at any joint ROM point. Simultaneously, manipulation is a high-velocity small-amplitude thrust applied at the ending point or immediately ahead of an available range of motion(13, 14). Spine-related pain disorders like neck pain have been treated clinically by High-velocity low-amplitude manipulation(9) due to neurophysiological effects such as hypoalgesia and muscle inhibition(15, 16). Puentedura, E. et al. in 2012 demonstrated a model that describes that mobilization of adjoining body segments may be involved for the treatment of any region of the body with limitations or dysfunctions(17). A recent study conducted by Joshi S, Balthillaya G, Neelapala YRJC, Therapies M.in 2020 found that the cervicothoracic junction mobilization was not better than the thoracic manipulation to reduce neck pain immediately(11).

Cervical and thoracic manipulation commonly used to treat neck pain. According to recent shreds of evidence, it is difficult to decide that either thoracic high-velocity low amplitude (HVLA) manipulation is better or non-thrust mobilization. To date, few studies have found out the impact of thrust manipulation versus non-thrust mobilization at the cervicothoracic junction in mechanical neck pain. The researcher aimed to observe the short-term effects of thrust manipulation and non-thrust mobilization at the cervicothoracic junction to reduce Pain and increase ROM in cervical spine movements among patients having mechanical sort of neck pain.

METHODOLOGY

The study design used was a Quasi-experimental design. A sample size of 80 patients was taken and the study was conducted at Riphah Rehabilitation Center, Lahore. The study was completed in 6 months after the approval of the synopsis from the Riphah Research Review Committee. A sample size of 80 was calculated by the Online Epitool Sample size Calculator(18). Patients were divided into two groups. Each group was allocated with 40 patients. Informed written consent was taken from the patients before their inclusion in the study. Group A (thrust manipulation) was treated with thrust manipulation at the cervicothoracic junction and Group B (Non-thrust mobilization) was treated with Non-thrust mobilization at the cervicothoracic junction. Short wave diathermy was used as a standard treatment in both groups. Inclusion criteria were Patients of Age 20-40 years, Pain felt anywhere in the cervical spine from superior nuchal line to the first thoracic spinous process, Patients presenting with complaint of mechanical neck pain for no less than one month duration, Neck pain aggravated by movement or sustained neck posture, Neck pain without radicular symptoms, i.e. radiating to head, chin and upper limbs and Limited range of motion in cervical movements. Patients were excluded if they exhibited any of the following criteria; Any red flag sign, e.g., infection, malignancy, fracture, rheumatoid arthritis, Metabolic diseases like osteoporosis, resting blood pressure higher than 140/90 mmHg, prolonged history of steroid use, whiplash injury within previous six weeks, cervical or thoracic spine surgery,

cervical radiculopathy or myelopathy, Previously treated with spinal manipulation within the past one month, positive extension-rotation test, two or more positive nerve root compression signs, cervical spinal stenosis presented with bilateral upper extremity symptoms.

Treatment Procedures:

Cervicothoracic Junction Non-Thrust mobilization: Each participant received direction-specific Maitland mobilization to the C7-T1 level, as indicated by the Primary movement restriction. The central PA glide was used for flexion- extension restriction while for rotation and side flexion restrictions, unilateral PA glide was used. The therapist determined the mobilization grade based on the magnitude, duration, and perception of pain. The mobilization was performed on the patient in a prone position, with his forehead resting on his hands. The mobilization was done in three sets of 30-second bouts.

Cervico-Thoracic Thrust manipulation: A high-velocity, low-amplitude (HVLA) thrust was received by this group at the cervicothoracic junction (C7- T1). The degree of manipulation was determined by hypomobility as measured by testing of passive accessory intervertebral movements (23). Prone position was opted to perform thrust manipulation by placing hands over hypomobile vertebral segment. A single HVLA was given, and if audible sound was not detected, another thrust was delivered at the same level.

The therapist interviewed the patients after the intervention in both groups to determine any possible adverse effects. Data were collected through the numeric pain rating scale and Universal goniometer for the active cervical ROM.

At the first visit, The Therapist accomplished a thorough case history, physical examination, and cervical spine assessment. The participant responded at the Numeric Pain Rating Scale as subjective measurement and the assessor then measured the cervical spine range of motion with a cervical goniometer as objective measurement. Treatment then continued according to the allocated groups. At the time of follow-up visit after 48 hours, the assessor reassessed the patient. After completing treatment on the 2nd visit, the patient responded at Numeric Pain Rating Scale and the assessor measured the Active Cervical ROM. All 80 participants received a total of 02 treatment sessions over 48 hours.

The data was analyzed using SPSS version 23. Descriptive Statistics were used for categorical variables. An Independent T-test was used to show across the group comparison. Repeated Measure ANOVA was used to show change of subjective as well as objective measurements over time.

RESULTS

Table-I shows that In Group A, mean height, weight, and BMI were 1.68±0.091, 70.75± 8.47, 25.07±3.15 respectively while in group B, mean height, weight, and BMI were 1.71±0.09, 73.07±8.34, 24.91± 3.45 respectively.

Table-I: Anthropometric measurements across both groups

Study Group	Thrust Manipulation	Non-Thrust Mobilization
Height	1.68 ± 0.091	1.71 ± 0.09
Weight	70.75 ± 8.47	73.07 ± 8.34
BMI	25.07 ± 3.15	24.91 ± 3.45

Table-II: Across the Groups Comparison of Outcome Variables

	Thrust Manipulation	Non-thrust Mobilization	P-value (Across the group)
NPRS Scale			
Pre-treatment	8.04 ± 0.84	8.00 ± 0.86	0.86
Post-Treatment I (T1)	5.36 ± 1.07	6.08 ± 0.86	0.01
Post-Treatment II (T2)	2.16 ± 1.03	4.12 ± 1.01	< 0.001
Cervical Flexion Range (degree)			
Pre-treatment	41.84 ± 5.08	42.08 ± 4.84	0.865
Post-Treatment I (T1)	52.76 ± 6.31	48.16 ± 5.04	< 0.001
Post-Treatment II (T2)	68.16 ± 7.00	57.04 ± 5.46	<0.001
Cervical Extension Range (degree)			
Pre-treatment	36.84 ± 3.49	37.04 ± 3.29	0.836
Post-Treatment I (T1)	49.44 ± 2.97	43.64 ± 3.12	< 0.001
Post-Treatment II (T2)	68.16 ± 4.40	54.04 ± 3.73	< 0.001
Cervical Right side Flexion Range			
Pre-treatment	29.04 ± 0.61	28.96 ± 0.60	0.926
Post-Treatment 1 (T1)	36.56 ± 0.38	33.56 ± 0.60	< 0.001
Post-Treatment II (T2)	44.48 ± 0.33	38.48 ± 0.614	< 0.001
Cervical Left side Flexion Range			
Pre-treatment	28.44 ± 2.73	28.24 ± 2.69	0.796
Post-Treatment I (T1)	37.60 ± 2.23	33.60 ± 2.82	< 0.001
Post-Treatment II (T2)	44.28 ± 1.56	38.52 ± 2.67	< 0.001
Cervical Right Rotation			
Pre-treatment	53.04 ± 3.79	53.12 ± 3.88	0.942
Post-Treatment I (T1)	64.72 ± 4.25	59.52 ± 3.85	< 0.001
Post-Treatment II (T2)	75.60 ± 4.36	66.72 ± 3.42	< 0.001
Cervical Left Rotation			
Pre-treatment	53.64 ± 3.80	53.60 ± 3.75	0.970
Post-Treatment I (T1)	65.76 ± 3.87	60.60 ± 4.16	< 0.001
Post-Treatment II (T2)	77.60 ± 2.98	67.92 ± 4.03	< 0.001

Table-II shows that in terms of group comparison, there was a significant difference at T1 & T2 with a p-value <0.05 for NPRS. It also shows progress in the Goniometric gain in ROM for flexion, extension, right & left side flexion, right & left rotation ROM in both groups with a p-value <0.001.

DISCUSSION

This study assessed the momentary effects of thrust manipulation and non-thrust mobilization at the cervicothoracic junction among patients suffering with postural neck pain. This study found that both manual therapy interventions resulted in clinically significant improvements, but patients who received thrust manipulation showed better pain relief and cervical ROM gain.

In 2015, David Griswold et al. found that no apparent difference was obtained in clinical outcomes between thrust manipulation and non-thrust mobilization applied to the cervical and thoracic spine among patients of postural neck pain. Both groups showed clinically significant changes in Pain and cervical ROM from pre-treatment to last treatment session(13). However, in the current study, the researcher applied both techniques at the cervicothoracic junction and observed short term effects of both manual therapy techniques, which showed better improvements in patients who received thrust manipulation.

A systematic review includes forty seven RCT studies from January 2007 to September 2017 related to comparing manipulation/mobilization therapies with each other, with other treatment, sham treatment, and no treatment on a patient with non-specific neck pain. Several types of mobilization and manipulation improve function and pain alleviation among patients with nonspecific neck pain than other treatments (19). In the current study, both mobilization and manipulation are effective in reducing pain and increase cervical ROM.

In 2011 Lau HMC, Chiu TTW, Lam T-H. Suggested that some contemporary pieces of evidence support that thoracic high-velocity low amplitude thrust (HVLA) manipulation gives better outcomes than non-thrust mobilization(20). In 2010 Gross, A. et al. found a systematic review that supports a shred of substandard evidence that with chronic neck pain, a single treatment session of HVLA thrust manipulation at the thoracic spine gives better results in terms of pain relief as compared to placebo(21). Puentedura et al. in 2011 observed that HVLA thrust manipulation at cervical spine rather than thoracic spine to observe short and long-standing record and observed more benefit in reduction of pain and disability limitation (17).) In this study, both mobilization and manipulation at the cervicothoracic junction show short-term improvement after the first and second treatment session, but high-

velocity low amplitude thrust manipulation revealed more remarkable improvement in cervical ROM and reduction in Pain.

CONCLUSION

The study concludes that patients who received thrust manipulation at the cervicothoracic junction showed more significant short-term improvements in pain and cervical range of motion among patients with mechanical neck pain.

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