DOI: https://doi.org/10.53350/pjmhs20221612592

ORIGINAL ARTICLE

Effectiveness of Thoracic Manipulation and Cervicothoracic Mobilisation in Decreasing Pain and Increasing Rom in Nonspecific Neck Pain

MADIHA SADDIQUE[1], MAZHAR ALI BHUTTO[2], SAMAN JAHANGIR[3], AYESHA SADIQ PT[4], MUHAMMAD SAAD SHAFIQ[5], IBRAHEEM ZAFAR[6], RAMSHA MASOOD[7], MUHAMMAD WAQAS MALIK[8]

[1]*Physiotherapist, University of Lahore.*
[2]*HOD Physiotherapy Department Sindh Govt Civil Hospital Khairpur*
[3]*Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad.*
[4]*PT, Riphah International University*
[5]*Lecturer, Ibadat international university Islamabad*
[6]*Lecturer, Shifa tameer-e-Millat University Islamabad*
[7]*Lecturer, Ibadat international university Islamabad*
[8]*The Islamia University of Bahawalpur*
Correspondence author: Mazhar Ali Bhutto, Email: MMazharbhutto@gmail.com

ABSTRACT

BACKGROUND: Hypomobility of the cervicothoracic (CT) junction has been suggested neck discomfort as one of its causes.There are, however, few trials that have contrasted the impact of CT junction mobilisation against a successful neck pain intervention. The treatment of distant spinal segments using thoracic spine manipulation is non-specific and is founded on the notion of interregional reliance.Recent studies have examined the usefulness of segment-specific spinal mobilisation in the cervical spine, although no firm findings could be drawn from earlier research. The aforementioned factors call for research into the effectiveness of a particular CT junction mobilisation vs a general thoracic manipulation intervention in neck discomfort.

MATERIAL AND METHODS: Participants in a randomised clinical trial with mechanical neck soreness and Cervicothoracic junction dysfunction were randomly assigned to the mid-thoracic (T3-T6) manipulation group or the C7-T1 stage Maitland mobilisation group. The results of the cervical flexion, extension, facet flexion, and rotation degrees of movement (ROM) before and after the intervention have been measured the use of a cervical range of motion (CROM) device. The severity of self-stated ache become measured using the numerical pain score scale (NPRS). After the intervention, a one-way ANCOVA was used to evaluate the outcomes.

RESULTS: For the study, 48 individuals have been enrolled, with a median age of 36.Forty eight±12.Forty eight for the thoracic manipulation organization and 34.25± 12.24 for the CT junction organization. After treatment, there were no discernible differences in cervical variety of movement (ROM) or self-said ache depth among thegroups (p-value = 0.07, 0.96, 003, 0.Forty, 0.30, 0.31 for flexion, extension, bilateralside bending, and rotation, respectively), nor in neck pain depth (p = 0.67). The cervical ROM and pain, however, extensively stepped forward in both businesses whilst in comparison within-institution, pre- and post.

CONCLUSION: This preliminary investigation showed that thoracic manipulation had the same effects on the outcomes of cervical range of motion and neck discomfort as level-specific Cervicothoracic mobilisation in patients with non-specific neck pain when it was compared to remote mid-thoracic manipulation.

KEYWORDS: Cervicothoracic Mobilization, Thoracic manipulation, Non-specific neck pain, ROM, mechanical neck pain

INTRODUCTION

With a frequency of between 30 and 50 percent among the general population, neck pain is the fourth most common global cause of disability-adjusted life years.[1] The underlying causes of neck pain depend on a number of different contributing factors, and they rarely involve just one specific anatomical feature [2]. Therefore, the most prevalent type of neck pain complaint is nonspecific neck pain which means neck discomfort that gets worse with cervical motions.[2]

The cervical-thoracic junction connects the more mobile lordotic cervical and less mobile kyphotic thoracic spines (CT). Increasing the mobility of the CT junction lowers pressure on the cervical spine by reducing the demand for movement in the mid and lower cervical segments.[3]

Neck discomfort is frequently treated with spinal mobilizations of the particular remote segment. Despite the hypothesis that neck pain may be caused by CT junction hypomobility, relatively few research have looked at how well CT junction mobilisation works.[4]

In a quasi-experimental have a look at, Creighton et al. Tested mobilisation techniques (gliding and distraction) utilised at the C7-T1 joint. After utilising each remedy modalities in a unmarried treatment session, they noticed higher rotation variety of motion (ROM) and reduced pain depth. One character best completed SNAGs to the C7 degree in a pre-submit unmarried organization experiment that mainly addressed the cervicothoracic area (C5-T4 degrees) over the route of three periods.[5]

In a recent study, Kim & Kim discovered that cervical mobilizations (C7-T3) were more effective than upper cervical mobilizations. Due to the reality that it is based at the ideas of regional interdependence and the neurophysiological consequences of manual remedy, thoracic backbone manual therapy has been utilised notably to treat neck pain. [6]

Thoracic manipulation is more effective than thoracic mobilisation for relieving pain and disability in the short term, according to recent systematic reviews.Due to the lack of information on the procedure, a randomised clinical trial was carried thoracic spine manipulation and CT junction mobilisation for the treatment of mechanical neck discomfort. The trial has been carried out specifically on individuals with CT junction dysfunction to ascertain the necessity of level-specific cervical spine mobilisation. [7]

Significance of the study and research gap: If a significant difference is found in both the techniques, the superiority of one technique over the other would be established which will improve the clinical practice outcomes in treatment of non-specifixlc neck pain.

The effectiveness of CT mobilisation and thoracic manipulation has been extablished in many previous studies but no previous work has been done to compare the effctiveness of CT mobilisation and thoracic mobilisation in non-specific neck pain.

MATERIALS AND METHODOLOGY

Study Design: Randomized Control Trial
Setting: Holy Family Hospital, Rawalpindi
Duration of Study: 6 months
Sample Size:
Sampling Technique:
Inclusion Criteria:

- neck pain (Acute/Chronic)
- 18 to 60 years of adults
- Moderate/severe pain intensity

Exclusion Criteria:

- recent history of a serious trauma
- neurologic signs/specific pathologies.'
- spinal surgery
- pregnancy
- red flags.
- cervical radiculopathy, severe headaches, cervical spine fracture, or vertebrobasilar insufficiency.

Data Collection Procedure: Both the groups were randomly assigned to the subjects. Total 46 participants were divided into two groups at random using the sealed envelope method. Each group had 23 participants. It was not possible to blind the patients and the healthcare provider to the intervention.

Intervention:

CT junction mobilization: Depending on the participants' predominant mobility constraint, the C7-T1 level underwent direction-specific Maitland mobilisation. Based on the patient's pain's severity, intensity, and character, the therapist chose the level of mobilisation. When the mobilizations were carried out, the patient lay prone with his forehead resting on his hands. Three sets of the mobilisation took place over the course of 30 seconds. Using overlapping thumbs on the spine of C7 vertebrae , the therapist performed central Postero-Anterior glide while applying a central pressure that was directed toward the participant's head.To mobilise an articular process for unilateral PA, the therapist positioned their thumbs on its posterior surface and provided anteriorly directed oscillatory pressure.[8]

Thoracic manipulation: High-velocity, low-amplitude (HVLA) thrusts were administered to group members at the mid-thoracic spine (T3- T6). Hypomobility measured with PAIVM testing was used to determine the degree of manipulation.. In the prone position, the therapist performed thrust manipulation while placing his or her hands over the hypomobile vertebra's zygapophyseal joints. If the audible cavitation was not attained after one HVLA, a second shove was applied at the same level. The treatment provider conducted interviews with participants in both groups following the intervention to assess the intervention's potential negative effects.[9]

RESULTS

In Inter-group Comparison, , There have been no statistically tremendous differences between the two groups in the comparison of the postintervention baseline adjusted mean outcomes according to the one-way ANCOVA analysis (p value > 0.05). The table shows the adjusted baseline mean differences and the post-intervention scores (95 percent confidence interval). The mean differences are less than the cervical ROM's approved MDC value.

The mean differences are less than the cervical ROM's approved MDC value.Following remedy with CT mobilisation, there was a statistically considerable improvement in flexion, extension, left lateral flexion, and bilateral rotation variety of movement (p-value=0.05). The imply differences for cervical ROM did now not, however, pass past the MDC. Just like this, a posttreatment statistically large lower in pain rating changed into also attained (p-value= 0.02).

A statistically tremendous exchange within the CROM and ache degrees (p-value = 0.01) changed into determined in the thoracic manipulation organization.

The pre-publish enhancements for cervical ROM did no longer surpass the MDC values, just like the CT junction group.

Table 1 Participant demographics (n = 42)

	CT junction mobilization group (n = 21)	Thoracic manipulation group (n = 21)
Age (in years) *	35.14 ± 10.13	38.47 ± 11.47
Gender +	13 (62%) male, 8 (38%) female	10 (48%) male, 11 (52%) female
BMI (in kg/m2) *	23.57 ± 3.24	26.09 ± 2.75
Duration of pain +	Acute- 4 (19%) Subacute –5 (24%) Chronic –12 (57%)	Acute- 2 (9%) Subacute–6 (29%) Chronic-13 (62%)

*mean and standard deviation
+frequencies

Table 2 Comparison between the groups (unadjusted means)

	CT junction group (mean ± SD)			Thoracic manipulation group (mean ± SD)			Adjusted mean difference (95% CI)	
	Baseline	Post treatment	p value	Baseline	Post treatment	p value		p value
Flexion	49.95 ± 8.59	54.52 ± 9.13	< 0.01	52.80 ± 11.88	55.28 ± 10.46	0.01	2.36 (– 0.9–5.6)	0.15
Extension	60.85 ± 13.15	64.42 ± 13.46	0.02	53.66 ± 10.51	58.09 ± 8.20	< 0.01	0.28 (– 3.2–3.8)	0.87
L SF	38.52 ± 9.20	41.33 ± 9.99	0.05	37.85 ± 9.18	41.19 ± 8.78	< 0.01	- 2.21 (– 4.9–0.5)	0.11
R SF	40.14 ± 10.38	41.66 ± 10.79	0.01	42.09 ± 11.42	42.09 ± 11.42	< 0.01	- 1.06 (– 4.2–2.1)	0.50
L ROT	61.80 ± 10.91	64.42 ± 12.36	< 0.01	57.90 ± 12.18	61.95 ± 14.10	0.02	1.42 (– 2.5–5.3)	0.47
R ROT	56.57 ± 10.06	59.90 ± 10.13	0.01	51.33 ± 15.85	57.71 ± 14.63	< 0.01	0.28 (– 3.4–3.9)	0.87
NRS	5.52 ± 1.47	4.33 ± 1.95	< 0.01	6.52 ± 1.80	5.23 ± 1.54	< 0.01	– 0.12 (– 0.9–0.6)	0.75

Table 3: Outcome effect on neck pain and pressure pain sensitivity

	Pretreatment [a]	Posttreatment [a]	Within-Group Change Score [b]	Between-Group Difference in Change Score [b]
Pain intensity (0-10)				
Thoracic manipulation	6.0 ± 1.4	2.5 ± 1.7	−3.5 (−3.9 to −2.9)	1.4 (0.8 to 2.1) [c]
Thoracic mobilization	5.8 ± 1.2	3.7 ± 1.5	−2.1 (−2.4 to −1.6)	
PPTs (kPa)				
C5-C6 dominant side				
Thoracic manipulation	133.2 ± 36.8	168.1 ± 41.8	34.9 (28.5 to 41.3)	21.5 (13.3 to 29.6)
Thoracic mobilization	141.7 ± 35.8	155.1 ± 39.4	13.4 (8.2 to 18.6)	
C5-C6 nondominant side				
Thoracic manipulation	133.9 ± 36.0	171.7 ± 42.9	37.8 (30.8 to 44.8)	29.7 (17.7 to 41.7)
Thoracic mobilization	148.3 ± 34.7	156.4 ± 40.1	8.1 (−2.2 to 18.4)	
Second metacarpal dominant side				
Thoracic manipulation	261.8 ± 57.8	280.4 ± 61.1	18.6 (14.8 to 22.4)	1.2 (−21.1 to 23.6)
Thoracic mobilization	244.5 ± 81.1	264.3 ± 70.5	19.8 (−3.7 to 43.4)	
Second metacarpal nondominant side				
Thoracic manipulation	263.3 ± 60.1	283.7 ± 66.0	20.4 (15.2 to 25.7)	7.9 (−1.5 to 17.3)
Thoracic mobilization	257.5 ± 71.1	270.0 ± 72.9	12.5 (4.3 to 20.8)	
Tibialis anterior muscle dominant side				
Thoracic manipulation	430.8 ± 106.7	445.9 ± 110.2	15.1 (7.8 to 22.6)	5.2 (−2.9 to 13.4)
Thoracic mobilization	407.7 ± 129.8	417.6 ± 128.2	9.9 (6.6 to 13.3)	
Tibialis anterior muscle nondominant side				
Thoracic manipulation	434.2 ± 109.5	437.3 ± 132.1	3.1 (−20.3 to 26.6)	4.9 (−19.3 to 29.0)
Thoracic mobilization	412.6 ± 134.7	420.6 ± 134.2	8.0 (3.4 to 12.2)	

PPTs, pressure pain thresholds.

Table 4: Within-Group and Between-Group Analysis

Variable	Within-Group (Thoracic Manipulation)	Within-Group (Thoracic Mobilization)	Between-Group	P-value
NPRS	3.0 (2.5, 3.5)	1.2 (0.7, 1.2)	2.1 (1.7, 2.8)	<.001
NDI	‡ 11.0 (8.9, 11.8)	3.0 (1.7, 4.4)	8.2 (6.0, 9.8)	<.001

DISCUSSION

The effects on patients with neck discomfort and dysfunction of the CT junction are examined in this study, which is the first to compare thoracic manipulation with it (active control intervention). The findings found that after just one CT junction mobilisation session, neck discomfort participants with CT junction dysfunction did not respond any better to thoracic manipulation. This demonstrates that treating remote thoracic spine segments may not be more helpful than segment-specific mobilisation in patients who experience mechanical neck pain.

Only a small number of researchers have suggested that the CT junction is prone to considerable stresses and restricted CervicoThoracic junction movement contribute to cervical ache [5]. The mobilizations carried out on this test may also have advanced the cervical variety of movement (ROM) and reduced stiffness at the CT junction. After a single session of CT junction mobilisation, the increase in cervical range of motion (in degrees) is nearly equal to the earlier research.[10, 11]

Treatment was given to a nearby interdependent spinal region in the thoracic manipulation group, and they showed improvements in the research. The regional interdependence paradigm postulates that dysfunction in one region of the body may be influenced by dysfunction in nearby body segments. [8][12]

The increased mobility of the thoracic spine may be to blame for the gains in the thoracic manipulation group. . The pressures applied during thoracic manipulation also affect the cervical spine according to a study on a small sample. [13] Therefore, it's possible that the thoracic manipulation changed how dysfunctional each person's CT junction was, resulting in better ROM in this group.However, neither group's cervical ROM alterations exceeded the smallest detectable change documented in the literature. [14]

Along with the expected biomechanical alterations, the mobilisation and manipulation's neurophysiological consequences may have have contributed to the gains made. There is an immediate decrease in pain sensitivity following spinal manual treatment, a decline in temporal summation, a rise in remote pressure pain thresholds, and a drop in temporal summation.[15] Therefore, possible effects on the biomechanics, neurophysiology, and psychology may account for the instantaneous improvements observed. Following a single session of spinal mobilisation or manipulation to lessen pain and enhance mobility inside the cutting-edge have a look at. [16]

Historically, spinal mobilizations were performed to treat hypomobility and misalignment at a particular degree of spinal dysfunction. But for a number of years, studies in manual therapy have been interested in the requirement for spinal level-specific mobilisation, with mixed results Regarding the efficiency of segment-specific mobilisation versus general mobilisation in treating cervical discomfort, two prior systematic evaluations reached divergent conclusions.[17]

Powerful mobilizations for specific segments, consistent with the overview of Slaven et al. [18], whereas Hidalgo et al. Observed no distinction between segment-specific and standard mobilizations in the cervical spine.As a result, it is impossible to draw a definite conclusion about the necessity of level-specific cervical spine mobilisation.[19] The results of this investigation indicate that in participants with mechanical neck discomfort and CT junction dysfunction, level-specific mobilisation is not more effective than remote thoracic manipulation.

CONCLUSION

The study found that neck discomfort participants with non-specific pain did not respond better to thoracic manipulation following a single CT junction mobilisation treatment. This demonstrates that treating remote thoracic spine segments may not be more helpful than segment-specific mobilisation in patients with mechanical neck discomfort.

RECOMMENDATION: To further support the outcomes of this study, bigger pattern size studies investigating the long-time period results of CT junction mobilisation in neck discomfort are required.

REFERENCES

1. Hurwitz, E.L., et al., The Global Spine Care Initiative: a summary of the global burden of low back and neck pain studies. European Spine Journal, 2018. 27(6): p. 796-801.
2. Blanpied, P.R., et al., Neck pain: revision 2017: clinical practice guidelines linked to the international classification of functioning, disability and health from the orthopaedic section of the American Physical Therapy Association. Journal of Orthopaedic & Sports Physical Therapy, 2017. 47(7): p. A1-A83.
3. Stenneberg, M.S., et al., To what degree does active cervical range of motion differ between patients with neck pain, patients with whiplash, and those without neck pain? A systematic review and meta-analysis. Archives of physical medicine and rehabilitation, 2017. 98(7): p. 1407-1434.
4. Kim, S.-Y., et al., Effects of sling-based manual therapy on cervicothoracic junction in patients with neck pain and forward head posture: A randomized clinical trial. Journal of Bodywork and Movement Therapies, 2021. 27: p. 447-454.
5. Andrews, D.P., et al., Immediate and short-term effects of mulligan concept positional sustained natural apophyseal glides on an athletic young-adult population classified with mechanical neck pain: an exploratory investigation. Journal of Manual & Manipulative Therapy, 2018. 26(4): p. 203-211.
6. Griswold, D., et al., Pragmatically applied cervical and thoracic nonthrust manipulation versus thrust manipulation for patients with mechanical neck pain: a multicenter randomized clinical trial. journal of orthopaedic & sports physical therapy, 2018. 48(3): p. 137-145.
7. Masaracchio, M., et al., Thoracic spine manipulation for the management of mechanical neck pain: A systematic review and meta-analysis. PloS one, 2019. 14(2): p. e0211877.
8. Puentedura, E.J., et al., Thoracic spine thrust manipulation versus cervical spine thrust manipulation in patients with acute neck pain: a randomized clinical trial. journal of orthopaedic & sports physical therapy, 2011. 41(4): p. 208-220.
9. Maitland, G.D., Vertebral manipulation. 1986: Elsevier Health Sciences.
10. Wong, J.J., et al., Are manual therapies, passive physical modalities, or acupuncture effective for the management of patients with whiplash-associated disorders or neck pain and associated disorders? An update of the Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders by the OPTIMa collaboration. The Spine Journal, 2016. 16(12): p. 1598-1630.
11. Creighton, D., et al., A comparison of two non-thrust mobilization techniques applied to the C7 segment in patients with restricted and painful cervical rotation. Journal of Manual & Manipulative Therapy, 2014. 22(4): p. 206-212.
12. Lau, K.T., et al., Relationships between sagittal postures of thoracic and cervical spine, presence of neck pain, neck pain severity and disability. Manual therapy, 2010. 15(5): p. 457-462.
13. Engell, S., J.J. Triano, and S.J. Howarth, Force transmission between thoracic and cervical segments of the spine during prone-lying high-velocity low-amplitude spinal manipulation: a proof of principle for the concept of regional interdependence. Clinical Biomechanics, 2019. 69: p. 58-63.
14. Swanson, B.T., et al., Reliability and diagnostic accuracy of cervicothoracic differentiation testing and regional unloading for identifying improvement after thoracic manipulation in individuals with neck pain. Musculoskeletal Science and Practice, 2019. 39: p. 80-90.
15. Coronado, R.A., et al., Changes in pain sensitivity following spinal manipulation: a systematic review and meta-analysis. Journal of Electromyography and Kinesiology, 2012. 22(5): p. 752-767.
16. Gross, A., et al., Manipulation and mobilisation for neck pain contrasted against an inactive control or another active treatment. Cochrane Database of Systematic Reviews, 2015(9).
17. Chiradejnant, A., et al., Does the choice of spinal level treated during posteroanterior (PA) mobilisation affect treatment outcome? Physiotherapy Theory and Practice, 2002. 18(4): p. 165-174.
18. Slaven, E.J., et al., The relative effectiveness of segment specific level and non-specific level spinal joint mobilization on pain and range of motion: results of a systematic review and meta-analysis. Journal of Manual & Manipulative Therapy, 2013. 21(1): p. 7-17.
19. Hidalgo, B., et al., The efficacy of manual therapy and exercise for treating non-specific neck pain: A systematic review. Journal of back and musculoskeletal rehabilitation, 2017. 30(6): p. 1149-1169.