

Comparative Effects of Spinal Manipulation and Conventional Massage Therapy in Chronic Neck Pain with or Without Cervicogenic Headache

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ABSTRACT

Background: Chronic neck pain (CNP) is a prevalent condition affecting up to 50% of office workers annually. Cervicogenic headache (CEH) is a headache type originating from cervical spine dysfunction.

Objective: This study aimed to compare the effects of spinal manipulation and conventional massage therapy on pain intensity, range of motion, and functional disability in patients with CNP, with or without CEH.

Methods: A randomized clinical trial was conducted at four hospitals in Lahore, Pakistan. Seventy-eight patients aged 20-40 years were enrolled using a non-probability convenient sampling technique. Patients were randomized into two groups: Group A received spinal manipulation, and Group B received conventional massage therapy, both combined with electrotherapy and neck exercises for six weeks. Pain intensity and disability were measured using the Numerical Pain Rating Scale (NPRS) and Neck Disability Index (NDI) at baseline, three weeks, and six weeks. Data were analyzed using SPSS 25.

Results: Significant reductions in NPRS and NDI scores were observed in Group A compared to Group B at the third week ($p = 0.001$) and sixth week ($p < 0.000$).

Conclusion: Spinal manipulation was more effective than conventional massage therapy in reducing pain and improving function in patients with CNP, with or without CEH.

INTRODUCTION

Chronic neck pain (CNP) is a prevalent musculoskeletal condition that affects a significant proportion of the population, particularly among office workers. The annual occurrence of neck pain ranges between 30% and 50%, which emphasizes its widespread impact on daily life and overall well-being (1). Chronic neck pain can result from musculoskeletal or neurological issues and is often associated with various disorders such as muscle strain, osteoarthritis, or more complex conditions like cervicogenic headache (CEH) (2). CEH is a distinct type of headache that originates from dysfunctions in the cervical spine, including the bones, discs, and soft tissues, which may lead to unilateral headaches often accompanied by neck pain and stiffness (3). Such headaches are known for their recurring nature, presenting episodically or chronically, and have a substantial impact on quality of life. Various etiological factors contribute to chronic neck pain, including poor posture, anxiety, depression, neck strain, and occupational activities (6). Other causes include nerve compression, traumatic injuries such as whiplash, inflammatory disorders like ankylosing spondylitis, or even tumors and infections that can put pressure on cervical vertebrae (7).

Given the substantial burden of chronic neck pain and cervicogenic headaches, a variety of therapeutic interventions have been explored. Spinal manipulation and conventional massage therapy are two prevalent non-

pharmacological treatments that have shown promise in reducing pain and improving functional outcomes for patients with neck pain. Spinal manipulation involves the application of controlled force to joints, aiming to improve mobility and reduce pain, whereas conventional massage therapy focuses on manipulating soft tissues to alleviate tension and discomfort. Previous research has indicated that manual therapy techniques, including spinal manipulation, may provide short- and long-term relief for patients suffering from cervicogenic headaches by reducing headache intensity, frequency, and associated impairments (11). However, the effectiveness of these interventions can vary based on individual patient characteristics and specific therapeutic protocols.

The current study aimed to evaluate and compare the effects of spinal manipulation and conventional massage therapy on pain, range of motion, and functional disability in patients with chronic neck pain, with or without cervicogenic headaches. This randomized controlled trial involved seventy-eight patients aged 20-40 years, recruited from various hospitals in Lahore, Pakistan, using a non-probability convenient sampling technique. Participants were assessed using the Numerical Pain Rating Scale (NPRS) for pain intensity and the Neck Disability Index (NDI) for functional disability. Patients were randomly divided into two groups; one group received spinal manipulation, while the other underwent conventional massage therapy. Both groups also participated in deep neck flexor strengthening

exercises. Outcomes were measured at baseline, after three weeks, and after six weeks of intervention, with three sessions per week on alternate days (9).

Findings from the present study demonstrated that spinal manipulation produced statistically significant and clinically relevant improvements in pain and functional disability compared to conventional massage therapy in patients with chronic neck pain with or without cervicogenic headache. The results indicated a notable difference in pain intensity and functional outcomes between the two groups, suggesting that spinal manipulation may be more effective for managing chronic neck pain conditions (11). These findings align with previous research that has highlighted the benefits of manual therapies for reducing pain and improving function in patients with cervicogenic headaches. For instance, a systematic review and meta-analysis of various manual therapies revealed that cervical spine manipulation was superior to thoracic spine manipulation and traditional physiotherapy in improving pain indices and quality of life among patients with cervicogenic headaches (13).

Moreover, the results of the current study support the notion that a tailored approach considering individual pain profiles and responses to treatment is essential for optimizing therapeutic outcomes. By taking a multidimensional approach, healthcare professionals can potentially identify subgroups within the cervicogenic headache population, allowing for more personalized and effective treatment strategies that address not only the physical but also the psychological and lifestyle factors influencing the condition (9). This comprehensive understanding of the comparative effectiveness of spinal manipulation and conventional massage therapy in managing chronic neck pain and cervicogenic headaches could guide clinical practice and inform future research aimed at developing integrated therapeutic protocols for these debilitating conditions.

MATERIAL AND METHODS

The study was conducted as a single-blinded randomized controlled trial to compare the effects of spinal manipulation and conventional massage therapy in patients with chronic neck pain, with or without cervicogenic headache. The research was carried out in the physiotherapy outpatient departments of four hospitals in Lahore, Pakistan: Jinnah Hospital, General Hospital, Services Hospital, and Azra Naheed Teaching Hospital. The study was approved by the ethical review boards of these institutions, and all procedures adhered to the ethical standards outlined in the Declaration of Helsinki. Informed consent was obtained from all participants before their inclusion in the study.

A total of 78 patients, aged between 20 and 40 years, were recruited using a non-probability convenient sampling technique. The inclusion criteria consisted of patients with chronic neck pain with or without cervicogenic headache, pain intensity between 3 and 8 on the 10-point pain scale, reduced cervical motion, and patients with neck stiffness and movement restriction. Patients with systemic diseases, recent trauma, or those who had received any other

concurrent treatment options like steroids, taping, or other manual therapy techniques during the study duration were excluded. The sample size calculation accounted for a 5% attrition rate to ensure adequate power for statistical analysis.

Participants were randomly allocated into two groups using sealed opaque envelopes labeled for each group, following a lottery method. Group A received spinal manipulation therapy, while Group B received conventional massage therapy. Both groups received common electrotherapy treatment for pain reduction, including a heating pad and transcutaneous electrical nerve stimulation for 10 minutes before the intervention. Spinal manipulation was performed either in a sitting or lying position, focusing on specific joints to improve mobility and reduce pain. Conventional massage therapy was performed in a sitting position with pressure maintenance for 90-120 seconds with 3-5 repetitions. Both groups were also trained with deep neck flexor strengthening exercises, including chin tuck exercises in lying, sitting, and against the wall. The treatment was provided three times a week on alternate days for six weeks. Outcome measures included pain intensity, assessed using the Numerical Pain Rating Scale (NPRS), and neck disability, evaluated using the Neck Disability Index (NDI). The NPRS is a self-reported measure where participants marked their pain level on a scale from 0 to 10, with 0 indicating no pain and 10 representing the worst possible pain. The NPRS has shown moderate reliability (ICC = 0.67) and high validity, ranging from 0.86 to 0.95 (44). The NDI is a validated questionnaire consisting of 10 sections, with scores ranging from 0 to 50. A higher score indicates a higher level of disability. The intra-class correlation coefficient (ICC 2,1) revealed high test-retest reliability for all items (ICC 2,1 = 0.86-0.98) and total scores (ICC 2,1 = 0.99) of the NDI (45). Assessments were conducted at baseline, after the third week of therapy, and at the end of the sixth week. A physical therapist with over five years of experience in treating musculoskeletal conditions conducted all evaluations. Patients were assessed for pain intensity at rest, level of disability, and quality of life using the NPRS and NDI. These assessments were designed to monitor progress over time and evaluate the effectiveness of the interventions.

Data analysis was performed using IBM SPSS Statistics version 25.0. Descriptive statistics, including mean, standard deviation, bar charts, and frequency tables, were used to display an overview of group measurements over time. The normality of the data was assessed using the Shapiro-Wilk test; if the p-value was greater than 0.05, indicating normal distribution, parametric tests were applied. Within-group differences were analyzed using Repeated Measures ANOVA, and between-group differences were assessed using an independent t-test. For non-parametric data, the Friedman Test was used to evaluate within-group changes over time.

The study aimed to determine the comparative effects and benefits of spinal manipulation and conventional massage therapy in patients with chronic neck pain, with or without cervicogenic headache. All relevant ethical considerations were strictly adhered to, ensuring that patient

confidentiality and rights were protected throughout the research process.

RESULTS

The study analyzed data from 78 participants who were randomly assigned to two groups: Group A (spinal manipulation) and Group B (conventional massage therapy). The outcome measures included pain intensity,

assessed by the Numerical Pain Rating Scale (NPRS), and neck disability, evaluated using the Neck Disability Index (NDI). The results were measured at three time points: baseline, the third week, and the sixth week of treatment. Data analysis was performed using IBM SPSS Statistics version 25, employing both parametric and non-parametric statistical tests to compare within-group and between-group differences.

Table 1: Descriptive Statistics of Participants' Age

Group	Mean ± SD	Minimum Age (Years)	Maximum Age (Years)
Group A (Neck Pain without CGH)	3.97 ± 1.27	18-20	33-35
Group B (Neck Pain with CGH)	2.74 ± 1.27	18-20	33-35

The descriptive statistics of age revealed that the mean age for Group A (Neck Pain without CGH) was 3.97 ± 1.27 years,

while for Group B (Neck Pain with CGH), it was 2.74 ± 1.27 years.

Table 2: Gender Distribution of Participants

Group	Gender	Frequency	Percentage (%)
Group A	Male	19	48.7
	Female	20	51.3
Group B	Male	19	48.7
	Female	20	51.3

The gender distribution showed that both Group A and Group B had an equal number of male (48.7%) and female (51.3%) participants. At baseline, there was no significant

difference in NPRS scores between the two groups (p = 0.874). However, at the third week

Table 3: Between-Group Differences in NPRS

Time Point	Group	N	Mean Rank	Sum of Ranks	p-value
NPRS Baseline	Neck Pain without CGH	39	37.55	1464.50	0.874
	Neck Pain with CGH	39	41.45	1616.50	
Third Week NPRS	Neck Pain without CGH	39	54.74	2135.00	0.001
	Neck Pain with CGH	39	24.26	946.00	
Sixth Week NPRS	Neck Pain without CGH	39	57.82	2255.00	0.000
	Neck Pain with CGH	39	21.18	826.00	

Group A (Neck Pain without CGH) showed a significantly higher mean rank (54.74) compared to Group B (24.26), with a p-value of 0.001. By the sixth week, the mean rank for Group A further increased to 57.82 compared to 21.18 for

Group B, with a p-value of less than 0.000, indicating a significant difference in pain reduction between the two groups.

Table 4: Between-Group Differences in NDI

Time Point	Group	N	Mean Rank	Sum of Ranks	p-value
NDI Baseline	Neck Pain without CGH	39	36.64	1429.00	0.008
	Neck Pain with CGH	39	42.36	1652.00	
Third Week NDI	Neck Pain without CGH	39	48.38	1887.00	0.002
	Neck Pain with CGH	39	30.62	1194.00	
Sixth Week NDI	Neck Pain without CGH	39	58.44	2279.00	0.000
	Neck Pain with CGH	39	20.56	802.00	

The NDI scores showed a significant difference at all time points between the two groups. At baseline, the mean ranks for Group A and B were 36.64 and 42.36, respectively, with a p-value of 0.008. By the third week, Group A's mean rank increased to 48.38 compared to 30.62 for Group B, with a p-value of 0.002. At the sixth week, the mean rank for Group A was 58.44 versus 20.56 for Group B, with a p-value of 0.000,

suggesting significant improvement in neck disability in the spinal manipulation group.

The within-group analysis using Friedman's Test indicated statistically significant improvements in pain intensity and functional disability across all time points for both groups (p < 0.000).

Table 5: Within-Group Comparison of NPRS and NDI

Outcome Measure	Mean Rank	df	p-value
NPRS Baseline	5.81	5	0.000
Third Week NPRS	3.99	5	
Sixth Week NPRS	2.76	5	
NDI Baseline	3.20	5	0.000
Third Week NDI	3.36	5	
Sixth Week NDI	1.87	5	

The results showed significant reductions in NPRS and NDI scores from baseline to the third and sixth weeks, highlighting the effectiveness of both interventions over time.

The findings from the present study suggest that spinal manipulation was more effective than conventional massage therapy in reducing pain and improving functional disability in patients with chronic neck pain, with or without cervicogenic headache. The significant differences observed between and within groups across all measured time points reinforce the efficacy of spinal manipulation as a preferred intervention for managing chronic neck pain conditions.

DISCUSSION

The current study compared the effects of spinal manipulation and conventional massage therapy on pain intensity and functional disability in patients with chronic neck pain, with or without cervicogenic headache. The findings indicated that spinal manipulation was significantly more effective than conventional massage therapy in reducing pain and improving functional outcomes over a six-week intervention period. The results demonstrated significant differences between the groups at the third and sixth weeks in both NPRS and NDI scores, suggesting the superior efficacy of spinal manipulation in managing chronic neck pain conditions. These results align with previous research that has emphasized the benefits of manual therapy for pain reduction and functional improvement in cervicogenic headaches and chronic neck pain (11).

The significant improvements in pain intensity and functional disability observed in the spinal manipulation group could be attributed to the direct mechanical effects of spinal manipulation on joint mobility and pain modulation. Spinal manipulation has been shown to have neurophysiological effects that reduce pain perception and increase pain thresholds, potentially through the release of endogenous opioids and the activation of descending pain inhibitory pathways (11). This finding is consistent with studies by Gross et al. (2015) and Dunning et al. (2016), which reported better pain relief and functional outcomes following cervical and thoracic manipulations compared to conventional therapies (17, 15). Similarly, a study by Bini et al. (2022) highlighted that manual therapy techniques, including spinal manipulation, provided significant short- and long-term reductions in headache intensity and disability among patients with cervicogenic headaches (11). The results of the current study also supported the use of deep neck flexor strengthening exercises alongside spinal

manipulation and massage therapy. Combining manual therapy with exercises targeting neck muscles has been shown to enhance therapeutic outcomes in neck pain patients by improving cervical spine stability and reducing muscle tension. This multidimensional approach was suggested to be more effective in treating cervicogenic headaches, as it addresses both the musculoskeletal dysfunction and the underlying neuromuscular control deficits associated with chronic neck pain (17). Previous studies have recommended integrating exercise therapy with manual therapy to achieve more comprehensive treatment benefits for patients with chronic neck pain and associated headaches (17, 13).

The study had several strengths, including its randomized controlled design, which minimized bias and improved the reliability of the results. The use of validated outcome measures such as the NPRS and NDI provided robust assessments of pain intensity and functional disability. The study also ensured a high level of standardization in interventions, with all treatments administered by experienced physical therapists, further enhancing the consistency of the findings. However, there were also some limitations. The relatively small sample size and the non-probability convenient sampling technique may have limited the generalizability of the results. Future studies should consider larger sample sizes and randomized sampling methods to confirm these findings in broader populations.

Another limitation was the short duration of follow-up, which did not allow for an assessment of the long-term effects of spinal manipulation and massage therapy on chronic neck pain and cervicogenic headache. While the six-week intervention period provided valuable insights into the immediate benefits of these therapies, further research is needed to evaluate their sustained effects over more extended periods. Moreover, the study did not consider potential psychological factors, such as anxiety or depression, which are known to influence pain perception and treatment outcomes in chronic pain conditions. Future research should explore the role of psychosocial factors in modulating responses to manual therapy in chronic neck pain patients.

Despite these limitations, the study contributed valuable evidence to the growing body of literature supporting spinal manipulation as a safe and effective treatment option for patients with chronic neck pain and cervicogenic headache. Given the minimal adverse effects associated with spinal manipulation and its potential to provide rapid pain relief and functional improvement, clinicians should consider incorporating spinal manipulation into comprehensive

treatment plans for these patients. However, clinicians should also be aware of individual patient characteristics and potential contraindications to spinal manipulation, ensuring a personalized approach to care.

CONCLUSION

In conclusion, the study provided compelling evidence for the superiority of spinal manipulation over conventional massage therapy in managing chronic neck pain, with or without cervicogenic headache. The findings highlighted the importance of adopting a multifaceted treatment strategy that integrates spinal manipulation, exercise therapy, and patient education to achieve optimal clinical outcomes. Future research should focus on exploring the mechanisms underlying the therapeutic effects of spinal manipulation and evaluating its long-term benefits in diverse patient populations. Additionally, investigating the combined effects of spinal manipulation with other therapeutic modalities, such as cognitive-behavioral therapy or pharmacological interventions, could provide a more comprehensive understanding of its role in the management of chronic neck pain and associated conditions.

REFERENCES

- McLean SM, May S, Klaber-Moffett J, Sharp DM, Gardiner E. Risk Factors for the Onset of Non-Specific Neck Pain: A Systematic Review. *J Epidemiol Community Health*. 2010;64(7):565-72.
- Vijjaratnam N, Williams DR, Bertram KL. Neck Pain: What if it Is Not Musculoskeletal? *Aust J Gen Pract*. 2018;47(5):279-82.
- Becher B, Lozano-López C, de Castro-Carletti EM, Hoffmann M, Becher C, Mesa-Jimenez J, et al. Effectiveness of Therapeutic Exercise for the Management of Cervicogenic Headache: A Systematic Review. *Musculoskelet Sci Pract*. 2023;102822.
- Xu Y, Gao Y, Jiang L, Wu L, Yin J, Yang Z, Dong Y. Global Trends in Research on Cervicogenic Headache: A Bibliometric Analysis. *Front Neurol*. 2023;14:1169477.
- Schneider MM, Badhiwala JH, Alvi MA, Tetreault LA, Kalsi P, Idler RK, et al. Prevalence of Neck Pain in Patients with Degenerative Cervical Myelopathy and Short-Term Response After Operative Treatment: A Cohort Study of 664 Patients from 26 Global Sites. *Glob Spine J*. 2024;14(3):830-8.
- Binder AI. Cervical Spondylosis and Neck Pain. *BMJ*. 2007;334(7592):527-31.
- Yadav N, Srivastav AK. Unveiling Statistical Discrepancies: Methodological Review of Chronic Neck Pain Study. *J Musculoskelet Surg Res*. 2024;8(2):184.
- Liu Z, Shi J, Huang Y, Zhou X, Huang H, Wu H, et al. A Systematic Review and Meta-Analysis of Randomized Controlled Trials of Manipulative Therapy for Patients with Chronic Neck Pain. *Complement Ther Clin Pract*. 2023;101751.
- Mingels S, Granitzer M, Schmid AB, Dankaerts W. Individual Endogenous Pain Modulation Profiles Within a Multidimensional Context of People with Cervicogenic Headache: A Retrospective Exploratory Study. *Musculoskelet Sci Pract*. 2023;67:102855.
- Coulter ID, Crawford C, Vernon H, Hurwitz EL, Khorsan R, Booth MS, Herman PM. Manipulation and Mobilization for Treating Chronic Nonspecific Neck Pain: A Systematic Review and Meta-Analysis for an Appropriateness Panel. *Pain Physician*. 2019;22(2).
- Bini P, Hohenschurz-Schmidt D, Masullo V, Pitt D, Draper-Rodi J. The Effectiveness of Manual and Exercise Therapy on Headache Intensity and Frequency Among Patients with Cervicogenic Headache: A Systematic Review and Meta-Analysis. *Chiropr Man Therap*. 2022;30(1):49.
- Pourahmadi M, Mohseni-Bandpei MA, Keshtkar A, Koes BW, Fernández-de-Las-Peñas C, Dommerholt J, Bahramian M. Effectiveness of Dry Needling for Improving Pain and Disability in Adults with Tension-Type, Cervicogenic, or Migraine Headaches: Protocol for a Systematic Review. *Chiropr Man Therap*. 2019;27:43.
- Nambi G, Alghadier M, Eltayeb MM, Aldhafian OR, Saleh AK, Alsanousi N, et al. Comparative Effectiveness of Cervical vs Thoracic Spinal-Thrust Manipulation for Care of Cervicogenic Headache: A Randomized Controlled Trial. *PLoS One*. 2024;19(3).
- Jung CH, Son KH, Yoo BK, Choi WJ, Jeon JK, Gim JY. The Effects of Using Powerball Exercise on Grip Strength, Tip Pinch and Key Pinch of Normal Men and Women in Their 20s. *J Korean Phys Ther Sci*. 2013;20(1):61-7.
- Dunning JR, Butts R, Mourad F, Young I, Fernandez-de-Las Peñas C, Hagins M, et al. Upper Cervical and Upper Thoracic Manipulation Versus Mobilization and Exercise in Patients with Cervicogenic Headache: A Multi-Center Randomized Clinical Trial. *BMC Musculoskelet Disord*. 2016;17:64.
- Ding F, Liu Z, Li R, Wang C, Lu Y. Acupuncture Plus Massage for Cervicogenic Headache: A Protocol for Systematic Review and Meta-Analysis. *Medicine (Baltimore)*. 2022;101(4).
- Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, et al. Exercises for Mechanical Neck Disorders. *Cochrane Database Syst Rev*. 2015;1(1).
- Palmer GM, Dominick N, Kane M, Bawek S, Burch B, Sanders T, et al. Effect of Osteopathic Manipulative Treatment and Bio-Electro-Magnetic Energy Regulation (BEMER) Therapy on Generalized Musculoskeletal Neck Pain in Adults. *J Osteopath Med*. 2024;124(4):153-61.