RESEARCH

Immediate Effect of Craniosacral Therapy on Postpartum Neck Pain—An Experimental Study

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Background: After giving birth, women may experience postpartum neck pain, which is frequently brought on by hormonal changes, physical strain during labor, or bad posture while tending to the newborn. In order to encourage relaxation, lessen pain, and enhance general well-being, craniosacral therapy (CST) is a gentle, hands-on method that focuses on releasing tension in the craniosacral system, which includes the fluid and membranes surrounding the brain and spinal cord.

Purpose: To assess immediate effects of CST on postpartum neck pain. It sought to evaluate changes in the intensity of neck pain and neck muscle contraction prior to treatment and 24 hours following CST. Pain severity was assessed using the Numerical Pain Rating Scale (NPRS) and neck muscle contraction was assessed using a pressure biofeedback unit (PBU).

Setting: Maternity wards of a tertiary-care hospital in Karnataka, India.

Participants: Postpartum women aged 21–40 years who were experiencing neck pain in the early puerperal period.

Research design: A single-group pre- and post-intervention experimental study.

Intervention: A single 30-min session of CST.

Main outcome measures: NPRS and craniocervical flexion test against PBU. Assessments were conducted pre-intervention and 24 h post-intervention. The data analysis was carried out using SPSS 29.0 software and Microsoft Excel 2019.

Results: CST resulted in a statistically significant reduction in postpartum neck pain, with the NPRS median score decreasing from 6 to 1 (76.14% reduction, $p < 0.01$). Additionally, there was a 4.40% increase in deep neck flexor muscle activation, as indicated by the PBU median value increasing from 27 mmHg to 28 mmHg ($p < 0.01$).

Conclusion: A single 30-min CST session significantly reduced postpartum neck pain and improved deep neck flexor muscle activation. These findings highlight CST as an effective immediate intervention for pain relief and muscle function enhancement in postpartum women.

KEYWORDS: Puerperium; postpartum; neck pain; craniosacral therapy; Numerical Pain Rating Scale; craniocervical flexion test; pressure biofeedback unit

INTRODUCTION

Postpartum women frequently experience neck pain during their hospital stay, often due to poor posture, labor complications, sudden movements, and straining.[1] Factors influencing postpartum neck and shoulder pain include mental state, breastfeeding, anemia during pregnancy, and a history of premenstrual syndrome, with breastfeeding being the most aggravating activity. Pain primarily affects the superior trapezius and posterior cervical regions.[2] Additionally, nerve sensitivity changes during labor and delivery can lead to musculoskeletal pain in the neck, shoulder, and lower back regions.[3] Studies indicate a high prevalence of postpartum neck pain, with rates reaching 73% in Japan, 58% in Malaysia, and over 53% in India.[3–5] Maternal health disorders, including neck pain, present significant challenges to new mothers' ability to provide essential care for their newborns, impacting both their capability and willingness to nurture their child effectively.[5,6]

Opioids are frequently prescribed after child birth, despite the risks they pose to breastfeeding mothers and their neonates. One significant concern is the risk of opioid toxicity in infants.[7] A case report highlighted the concern about neonate poisoning resulting from codeine use by the breastfeeding mother.[8] Hospitalizations often lead to opioid exposure, including in the postpartum setting.[9]

These findings highlight the need to educate clinicians about the risks of postpartum analgesics and to promote safer, non-pharmacologic pain management options. Non-pharmacologic therapies, including massage, perineal massage, warm baths, and childbirth preparation groups, have been shown to reduce pain, shorten labor duration, lower anxiety, and decrease the frequency of lacerations and episiotomies.[10]

Craniosacral therapy (CST) is considered a noninvasive, mindfulness-based manual treatment that uses gentle palpation techniques to release fascial restrictions between the cranium and the sacrum. The craniosacral system anatomically includes the structures of the central nervous system such as the skull, cranial sutures, cerebrospinal fluid (CSF), and the membranes surrounding the brain and spinal cord. It is closely linked to the musculoskeletal system. CST is believed to work by influencing the craniosacral body rhythm and releasing myofascial structures.[11–14]

CST has been shown to effectively reduce pain intensity in individuals with non-specific chronic neck pain with meta-analytic evidence indicating significant and lasting improvements in pain and function for up to 6 months in patients with chronic pain.[15–18] CST is a safe, preventive, and therapeutic approach applicable across all age groups. Despite certain design limitations in the available research, CST appears overall effective and safe in infants, children, and adults. It has been shown to relieve musculoskeletal pain, enhance health-related quality of life in pregnant women, and serve as a non-harmful, effective intervention for infants experiencing sucking difficulties that impact breastfeeding. Furthermore, CST supports overall well-being and helps manage a range of physical and psychological symptoms, with only minor and temporary side effects reported and no serious adverse events observed.[19–21]

However, meta-analyses by Amendolara et al. and Ceballos-Laita et al. found that CST had no significant clinical benefit for musculoskeletal or non-musculoskeletal conditions.[22,23]

Although CST shows potential in managing conditions like migraines, cervical headaches, and lower back pain, there is limited research on its standalone effectiveness, especially for pregnancy-related or postpartum issues such as acute postpartum neck pain. Hence, the current study explores the impact of the six-step CST protocol in treating postpartum neck pain during the early puerperal period.

METHODS

The study was conducted at a tertiary hospital in Karnataka, India. The study focused on postpartum women aged between 21 and 40 years for an experimental study with probability sampling as the sampling design and cluster sampling as the sampling technique. The study duration spanned for 12 months. The materials used in the study included an informed consent form, a data collection sheet, the Numeric Pain Rating Scale (NPRS),[24] and pressure readings from a pressure biofeedback unit (PBU) during the craniocervical flexion test (CCFT).[25,26]

The study was prospectively registered with the Clinical Trials Registry—India (CTRI) under the registration number CTRI/2024/08/073160.

The flow of participants through the study, including eligibility assessment, exclusions, allocation to the intervention, and analysis, is illustrated in Figure 1.

Inclusion Criteria

Puerperal women, aged between 21 and 40 years, experiencing neck pain with an NPRS score of ≥4, within 6–24 h after childbirth, were included in the study. Both cesarean and vaginal modes of deliveries were included in the study.

Exclusion Criteria

Women with medical conditions such as hypertension and diabetes, chronic musculoskeletal pain syndrome, congenital deformities, cervical radiculopathies, and

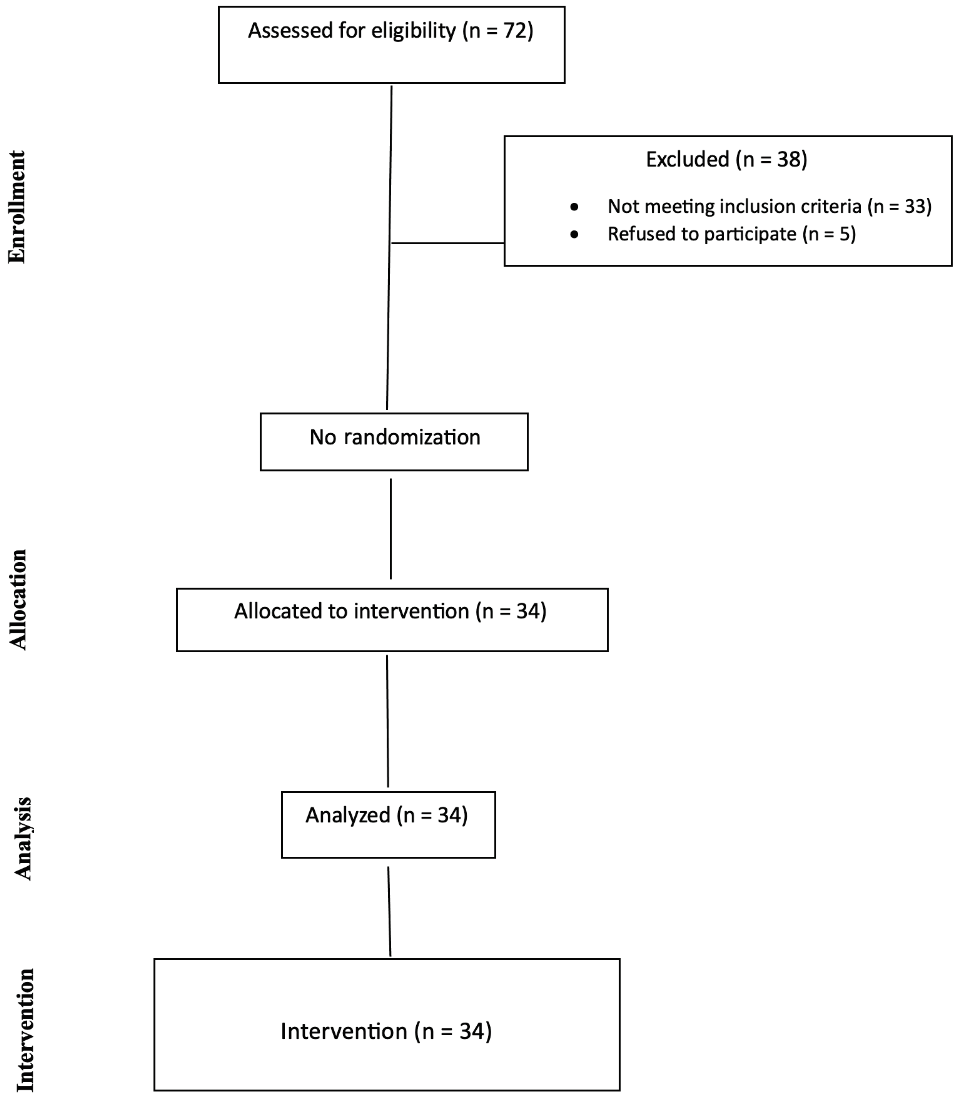

FIGURE 1. Flow diagram of participant recruitment, enrollment, allocation, intervention, and analysis.

spinal injury, and women suffering from febrile condition were excluded.

Outcome measures

An initial assessment of each participant was conducted before administering CST. NPRS[24] was used as a subjective pain rating questionnaire to measure pain intensity. CCFT with a PBU was used to objectively assess deep cervical flexor activation, endurance, and coordination. Since neck pain is known to reduce activation, function, range, and endurance of these muscles, the test helped evaluate their changes in relation to postpartum neck pain under a therapist's supervision.[25,26] Baseline measurements for both outcome measures, NPRS and PBU, were recorded. Following the completion of the initial assessment, the participants received CST. Re-assessment was conducted 24 h after receiving CST using the same outcome measures.

Intervention

The procedural steps were carried out in adherence to ethical standards and guidelines. Ethical clearance was obtained from the Institutional Ethical Committee. The study was registered at ClinicalTrials.gov (CTRI/2024/08/073160). All appropriate precautions were taken as per the Indian Council of Medical Research guidelines.

Participants were screened for inclusion and exclusion criteria. The study's purpose was explained and a written informed consent was obtained from each participant, ensuring confidentiality.

The six-step CST protocol registered at the Copyright Office Government of India (Reg. L-158081/2024) was used to administer the treatment by an experienced physiotherapist and craniosacral therapist. During the 30-min treatment session, each participant was positioned supine on the treatment table with head resting on a pillow and arms comfortably resting on either side of the body. The therapist was seated at the head end of the treatment table. CST began with assessing the craniosacral rhythm of the craniosacral system by placing hands on the shoulders and the cranium. Occipital base release was performed by using controlled, gentle mobilization of the occipital and cranial base to restore natural movement and alignment. The CST was administered by gently placing hands on either side of the occipital bone followed by the suboccipital release. A still point was achieved with the CV4 technique. Decompression of the atlanto-occipital joint was done by applying light pressure and subtle movements at the craniocervical junction. Recalibration was achieved using CST by placing hands on the cranial base to restore the natural rhythmic movement of the CSF. Participants reported no serious adverse effects following the therapy.

Statistical analysis

The data collected from the respondents were analyzed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, NY, USA) and Microsoft Excel 2019 (Microsoft Corporation, Redmond, WA, USA). For the purpose of processing and analyzing the collected data, statistical tools such as tables and charts were utilized in this research study. Mean and standard deviations were calculated for descriptive statistics. The normality test was conducted using the Shapiro–Wilk test to verify the distribution of the dataset. Since all data are non-normally distributed, a non-parametric test, the Wilcoxon signed-rank test, was used for comparing pre- and post-treatment median values of the outcome measures. Pre- and post-median values were calculated for each outcome measure. A value of $p < 0.05$ was used as the significance level. Wilcoxon's effect size (r) was used to quantify the magnitude of change due to intervention.

RESULTS

A total of 34 postpartum women aged between 21 and 40 years participated in the study. The mean age and body mass index of participants were 29.08 ± 4.42 years and 26.26 ± 2.49 kg/m^2, respectively (Table 1). Descriptive statistics of outcome variables (Table 2) revealed a significant reduction in NPRS scores from 5.91 ± 1.72 pre-intervention to 1.41 ± 1.37 post-intervention, indicating decreased pain levels. A slight increase in PBU scores from 26.79 ± 2.67 to 27.97 ± 2.66 suggests improved deep neck flexor control. The Shapiro–Wilk test (Table 3) indicated that the pre- and post-intervention data were not normally distributed ($p < 0.05$); therefore, non-parametric analysis was performed using the Wilcoxon signed-rank test (Table 4). A statistically significant reduction in pain intensity, measured by the NPRS, was observed post-intervention ($Z = -5.121$, $p < 0.001$). Similarly, pressure biofeedback readings, used to assess deep neck flexor activation, showed a significant improvement ($Z = -4.029$, $p < 0.001$).

Effect size analysis using Wilcoxon's r (Table 5) revealed a large effect for both outcomes. NPRS scores decreased from a median of 6 to 1 post-treatment, reflecting a 76% reduction in pain ($r = -0.87$), which exceeds the minimum clinically important difference (MCID) threshold. PBU readings increased from a median of 27 mmHg to 28 mmHg, with a 4.4% improvement and a large effect size ($r = -0.69$), suggesting clinically meaningful enhancement in muscle activation.

DISCUSSION

The challenges faced by women to care for their newborns can be frustrating and

Table 1. Descriptive Statistics for the Demographic Data

Variables	*Mean ± SD (n = 34)*
Age	29.08 ± 4.42
BMI	26.26 ± 2.49

BMI = body mass index; n = number of participants; SD = standard deviation.

stressful. Postpartum neck pain is one of these conditions that can impose difficulty in activities related to caring for the neonate such as breastfeeding.[5,6]

TABLE 2. Descriptive Statistics of All the Outcome Variables for Pre-Intervention and Post-Intervention

Variables	*n*	*Mean ± SD*	*Med*	*Min*	*Max*
NPRS					
Pre-treatment	34	5.91 ± 1.72	6	3	10
Post-treatment	34	1.41 ± 1.37	1	0	5
Pressure biofeedback unit					
Pre-treatment	34	26.79 ± 2.67	27	34	52
Post-treatment	34	27.97 ± 2.66	28	0	38

Max = maximum; Med = median; Min = minimum; NPRS = Numerical Pain Rating Scale; SD = standard deviation.

TABLE 3. Shapiro–Wilk Normality Test for All Outcome Variables

Statistic		*df*	*Sig.*
Pre-treatment (NPRS)	0.93	34	0.04*
Post-treatment (NPRS)	0.83	34	<0.001*
Pre-treatment (pressure biofeedback unit)	0.90	34	0.00*
Post-treatment (pressure biofeedback unit)	0.90	34	0.00*

df = degrees of freedom; NPRS = Numerical Pain Rating Scale; Sig. = two-tailed significance or p-value.
*p-values < 0.05 indicate statistically significant differences.

The purpose of this research was to evaluate the impact of CST in postpartum neck pain during the acute puerperal period. The findings demonstrated a clinically significant, 76.14% reduction in pain intensity and 4.40% improvement in deep neck flexors activation and neck mobility. This reduction in pain likely facilitated improved activation of the deep neck flexor muscles, contributing to enhanced neck mobility and supporting existing evidence that decreased neck pain is associated with better activation of these muscles.[26–28] The observed reduction in pain and improvement in mobility following CST may be explained by proposed mechanisms such as modulation of myofascial tension and facilitation of relaxation responses.[11,29] These mechanisms, however, remain hypothetical and are not yet fully supported by high-quality evidence.

Previous studies have supported the efficacy of CST in pain relief. For instance, one of the studies demonstrated sustained relief from chronic neck pain after 20 weeks of CST treatment, while another reported a significant reduction in migraine pain 4 weeks post-treatment.[20,21] However, previous studies involved longer treatment durations and lacked standardized protocols, whereas the present study examined the immediate effects of a single CST session using a defined protocol.

This is the first study to investigate the immediate effects of this specific six-step CST protocol for alleviating postpartum neck pain, which involves six predefined techniques applied in a structured sequence. It indicates a clear therapeutic benefit, supporting CST as an effective intervention for managing acute postpartum neck pain. This is also the first study to examine the effectiveness of CST in post-

TABLE 4. Wilcoxon Signed-Rank Test of the Outcome Variables

Variables		*n*	*Mean ± SD*	*Med*	*Min*	*Max*	*Z*	*p-Value*
NPRS	Pre-treatment	34	5.91 ± 1.72	6	3	10	−5.121	<0.001*
	Post-treatment	34	1.41 ± 1.37	1	0	5		
Pressure biofeedback unit	Pre-treatment	34	26.79 ± 2.67	27	22	30	−4.029	<0.001*
	Post-treatment	34	27.97 ± 2.66	28	24	33		

Z = Wilcoxon signed-rank test statistic (standardized test statistic). A negative *Z*-value indicates a decrease in post-treatment values compared to pre-treatment.
Max = maximum; Med = median; Min = minimum; NPRS = Numerical Pain Rating Scale; SD = standard deviation.
*p-values < 0.05 indicate statistically significant differences.

TABLE 5. Wilcoxon's Effect Size (*r*) and Clinical Significance of the Intervention: Pre- and Post-Treatment Changes (%) in NPRS and PBU Outcome Measures

Variable	*Effect Size (r)*	*Effect Size Interpretation*	*Percentage Change*	*Clinical Significance*
NPRS	−0.87	Large effect	76.14% ↓	Highly significant (exceeds MCID of 1.5–2.0 points)
PBU	−0.69	Large effect	4.40% ↑	Small improvement; clinical significance depends on MCID

Effect size (*r*)= $Z/\sqrt{N}$ where *Z* is the standardized test statistic from the Wilcoxon test and N is total number of observations. A value close to 0 suggests a small effect, while values closer to −1 or 1 suggest a larger effect. The sign of *r* indicates the direction of the effect.
MCID = minimal clinically important difference; NPRS = Numerical Pain Rating Scale; PBU = pressure biofeedback unit.

partum women experiencing neck pain during the acute puerperal phase (6–24 h post-delivery). Conducting the intervention during this early postpartum period allowed for the implementation of a single CST session while the mothers were still admitted to the maternity ward, making the treatment both timely and accessible. It indicates a clear therapeutic benefit, supporting CST as an effective intervention for managing acute postpartum neck pain.

Oltean et al. reported that CST techniques, when combined with kinetic strategies, were associated with reduced pain and improved cervical spine mobility.[30] Although these findings indicate the potential effectiveness of CST, the results cannot be attributed to CST alone because it was applied alongside other treatments. In contrast, the present study used CST as the sole intervention, providing a clearer evaluation of its independent effect on pain reduction and neck mobility. Additionally, most of the previous studies on CST have relied solely on subjective self-reported questionnaires, but in the present study we incorporated both subjective and objective outcome measures such as NPRS for pain intensity and the PBU to assess deep neck flexor activation during the CCFT. Both tools are validated and widely used for assessing neck pain and mobility, thereby strengthening the credibility of the findings. Also, researches on CST have commonly focused on long-term pain conditions such as chronic neck pain, lower back pain, migraines, and cervical headaches.[16,17] Unlike previous studies, the current research specifically evaluated the immediate effects of CST on acute neck pain in postpartum women, excluding those with chronic pain conditions. Results showed that a single CST session significantly reduced pain and improved neck mobility during the acute puerperal period, with no serious adverse events reported, suggesting CST may be a safer alternative to pharmacological pain management, which carries potential risks for both mother and newborn. The study is limited by its single-group, pre–post design, lack of a control group, and absence of follow-up. Despite these limitations, this preliminary work suggests the potential of the six-step CST protocol in providing immediate postpartum pain relief. Future research with larger, controlled trials, extended follow-up, and stratification by mode of delivery is warranted to validate its effectiveness and enhance its clinical applicability.

CONCLUSION

This preliminary study suggests that CST may provide immediate relief of neck pain and improve neck mobility in postpartum women during the acute puerperal period. However, given the single-group, pre–post design, absence of a control group, and lack of follow-up, these findings should be interpreted with caution. Larger, controlled studies with extended follow-up are needed to validate the effectiveness of the six-step CST protocol and to establish its role within postpartum rehabilitation programs, particularly for women seeking non-pharmacological pain management options.

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CONFLICT OF INTEREST NOTIFICATION

The authors declare there are no conflicts of interest.

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AUTHOR CONTRIBUTIONS

Conceptualization: SYH, AB; methodology: SYH; software: SYH; data curation: SYH; project administration: SYH, AB; formal analysis: SYH; resources: SYH; writing—original draft: SYH; writing—review and editing: SYH.

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