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Comparative Effects of Fascial Manipulation Technique Versus Joint Cavitation on the Atlanto-Occipital Joint in Patients with Cervicogenic Headache

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None declared.

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ABSTRACT

Background: Cervicogenic headache (CEH) is a secondary headache disorder originating from musculoskeletal dysfunctions of the cervical spine, particularly the atlanto-occipital (AO) joint. Office workers are highly susceptible due to prolonged sitting and poor posture. While manual therapy interventions are commonly used, comparative effectiveness between fascial manipulation technique (FMT) and joint cavitation (JC) remains underexplored.

Objective: To compare the effects of FMT and JC on pain, cervical range of motion (ROM), headache impact, and neck disability in office workers with CEH.

Methods: A single-blind randomized controlled trial was conducted with 36 office workers (aged 25–40 years) diagnosed with CEH. Participants were randomly allocated to Group A (FMT, n=18) or Group B (JC, n=18). Interventions were administered twice weekly for six weeks. Outcomes included Numeric Pain Rating Scale (NPRS), Cervical ROM (CROM device), Headache Impact Test (HIT-6), and Neck Disability Index (NDI), assessed at baseline and after six weeks. Non-parametric tests (Wilcoxon Signed Rank and Mann–Whitney U) were used for analysis.

Results: Both groups showed significant within-group improvements ($p<0.05$). However, between-group comparisons revealed that FMT produced statistically superior outcomes in pain reduction (NPRS-Head $p=0.014$; NPRS-Neck $p=0.014$), cervical ROM (flexion $p=0.005$; extension $p=0.010$; lateral flexion $p=0.041$), headache impact (HIT-6 $p=0.023$), and neck disability (NDI $p=0.004$).

Conclusion: Fascial Manipulation Technique is more effective than Joint Cavitation in improving pain, mobility, headache impact, and functional disability in patients with cervicogenic headache. These findings advocate for the integration of fascial-based approaches in CEH management protocols, particularly for sedentary populations.

KEYWORDS Cervicogenic headache, Atlanto-occipital joint, Fascial manipulation, Joint cavitation, Manual therapy, Neck disability, Office workers, Randomized controlled trial.

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INTRODUCTION

Neck pain and its associated disorders represent a significant global health burden, with cervicogenic headache (CEH) being a prevalent secondary headache originating from cervical musculoskeletal dysfunction [1]. CEH is characterized by unilateral headache pain referred from the upper cervical spine, often accompanied by neck stiffness, reduced cervical range of motion (ROM), and tenderness around the occipital region [2]. Epidemiological studies estimate that CEH constitutes 15–20% of all chronic headaches, with a higher prevalence among females and individuals engaged in sedentary occupations [3].

The atlanto-occipital (AO) joint, between the occiput and the atlas (C1), plays a crucial role in CEH pathogenesis. Dysfunction at this joint—due to poor posture, trauma, or repetitive strain—can lead to referred pain patterns characteristic of CEH, often mediated via the greater and lesser occipital nerves [4]. Office workers are particularly vulnerable due to prolonged static postures, forward head posture, and inadequate ergonomics, which increase mechanical stress on the AO joint and cervical fascia [5].

Current management strategies for CEH include pharmacological interventions, physical therapy, ergonomic modifications, and manual therapy techniques such as spinal manipulation, mobilization, and soft tissue therapy [6]. Among manual therapies, joint cavitation (JC)—a high-velocity, low-amplitude thrust manipulation aimed at restoring joint play—is commonly employed to address hypomobility and pain [7]. Alternatively, the Fascial Manipulation Technique (FMT), developed by Luigi Stecco, targets densifications in the deep fascial network to restore gliding between connective tissue layers, thereby normalizing biomechanical and proprioceptive function [8].

Although both approaches are used clinically, direct comparisons of their efficacy in CEH, particularly concerning AO joint involvement, are limited. Previous studies have explored spinal manipulation and instrument-assisted soft tissue mobilization [9], but few have contrasted fascial-specific interventions with joint-based techniques. This study aimed to fill this gap by evaluating and comparing the effects of FMT and JC on pain intensity, cervical ROM, headache-related disability, and functional impact in office workers with CEH.

MATERIALS AND METHODS

A single-blind, parallel-group randomized controlled trial was conducted at the Physiotherapy and Neurology Outpatient Departments of Jinnah Hospital, Lahore. Ethical approval was obtained from the institutional review board, and written informed consent was secured from all participants. The study was conducted over six months in 2023–2024.

Thirty-six office workers aged 25–40 years with a clinical diagnosis of CEH were enrolled. Diagnosis was confirmed using the flexion-rotation test and clinical criteria per the International Classification of Headache Disorders (ICHD-3). Inclusion criteria comprised: at least one year of office employment, 4–6 hours of daily sitting, at least one headache episode per week for three months, and restricted AO joint mobility. Exclusion criteria included other primary headaches (e.g., migraine), neurological disorders, recent cervical surgery, spinal pathologies, and contraindications to manual therapy.

Sample size was calculated using OpenEpi software with NDI as the primary variable (anticipated proportion = 0.60, CI = 95%, precision = 0.08), yielding 30 participants. After accounting for 20% attrition, 36 participants were recruited. They were randomly allocated into two equal groups (n=18 each) via sealed envelope randomization.

Both groups received interventions twice weekly for six weeks, each session lasting approximately 45 minutes.

Group A (Fascial Manipulation Technique): Therapist applied deep friction using elbows or knuckles on predetermined fascial centers of coordination (CC) as per the Stecco method. Points were selected based on a prior assessment of movement limitations and palpatory findings. Each point received 5–8 minutes of sustained pressure until hyperemia was achieved. Treatment aimed to restore fascial glide and reduce densification.

Group B (Joint Cavitation): Upper cervical rotational manipulation was performed bilaterally with the participant in supine. The therapist applied a high-velocity, low-amplitude thrust at the end-range of rotation (70–80°) with slight contralateral lateral flexion, aiming to achieve cavitation at the AO joint. A maximum of three attempts per side were allowed per session.

Assessments were conducted at baseline and after six weeks by a blinded assessor.

· Numeric Pain Rating Scale (NPRS): 0–10 scale for head and neck pain intensity.
· Cervical Range of Motion (CROM): Measured in degrees for flexion, extension, lateral flexion, and rotation using a CROM device.
· Headache Impact Test (HIT-6): 6-item questionnaire assessing headache-related disability (score 36–78).
· Neck Disability Index (NDI): 10-item scale evaluating neck pain interference with daily activities (0–50).

Data were analyzed using SPSS version 23. Normality was assessed using Shapiro–Wilk test; non-normal distribution led to the use of non-parametric tests. Within-group changes were analyzed with Wilcoxon Signed Rank Test, and between-group differences with Mann–Whitney U Test. Significance was set at $p < 0.05$.

RESULTS

Demographic and clinical characteristics were comparable between groups (Table 1). Mean age was 46.9±4.7 years in Group A and 47.5±4.3 years in Group B. Gender distribution, headache frequency, and duration were also similar ($p > 0.05$), confirming successful randomization.

Both groups exhibited statistically significant improvements from baseline to week 6 in all outcome measures ($p < 0.05$) (Table 5). Reductions in NPRS scores (head and neck), HIT-6, and NDI were noted alongside increases in all cervical ROM directions.

At week 6, Group A (FMT) demonstrated significantly greater improvement than Group B (JC) in:

· NPRS (Head): $p = 0.014$
· NPRS (Neck): $p = 0.014$
· Cervical flexion ROM: $p = 0.005$
· Cervical extension ROM: $p = 0.010$

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· Lateral flexion ROM: p = 0.041
· HIT-6: p = 0.023
· NDI: p = 0.004

No significant between-group differences were observed at baseline ($p > 0.05$), confirming that post-intervention differences were attributable to the treatments.

DISCUSSION

This RCT provides evidence that both FMT and JC are effective in managing CEH symptoms, but FMT yields superior outcomes in pain reduction, functional mobility, headache impact, and disability. The findings align with emerging literature emphasizing the role of fascial integrity in musculoskeletal pain syndromes.Pain Reduction: FMT's greater effect on NPRS scores may be attributed to its impact on deep fascial mechanoreceptors (Ruffini endings, interstitial receptors), which modulate pain perception and autonomic responses [10]. JC, while effective in transiently relieving joint stiffness, may have less sustained effect on nociceptive signaling from periarticular tissues.Cervical Mobility: Significant ROM improvements with FMT support the concept that fascial restrictions contribute to global movement limitations. By releasing fascial densifications, FMT likely enhances myofascial force transmission and reduces compensatory muscle guarding [11]. JC primarily targets joint capsule restriction, which may explain its comparatively smaller effect on multiplanar ROM.Functional Impact: The greater reduction in HIT-6 and NDI scores in the FMT group suggests that addressing fascial dysfunction has broader implications on daily functioning and quality of life. This may be due to improved proprioception, normalized muscle tone, and enhanced neuromuscular control following fascial intervention [12].Clinical Relevance: For office workers with CEH, FMT offers a comprehensive approach by addressing both local tissue restrictions and global movement patterns. Integrating FMT into rehabilitation programs may enhance long-term outcomes and reduce recurrence. JC remains a useful adjunct for addressing specific joint hypomobility but may need supplementation with soft tissue or exercise approaches.

This study had a modest sample size, short-term follow-up, and was single-blinded. The population was restricted to office workers, limiting generalizability. Future studies should include larger, diverse samples, longer follow-up, objective imaging or biomechanical measures, and perhaps combined intervention arms.

CONCLUSION

Fascial Manipulation Technique produces significantly greater improvements than Joint Cavitation in reducing pain, enhancing cervical mobility, decreasing headache impact, and alleviating neck disability in office workers with cervicogenic headache. These findings advocate for the inclusion of fascial-based manual therapy in evidence-based management protocols for CEH, particularly in sedentary populations.

RECOMMENDATIONS FOR FUTURE RESEARCH

1. Conduct larger multicenter RCTs with longer follow-up periods (e.g., 6–12 months).
2. Use double-blind designs where feasible, with sham control groups.
3. Incorporate objective measures such as ultrasound elastography, pressure pain threshold mapping, or kinematic analysis.
4. Explore combined interventions (FMT + exercise, FMT + ergonomic training) for synergistic effects.
5. Investigate cost-effectiveness and return-to-work outcomes in occupational health settings.

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