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Running Title (within 10 words)	Effect of dry cupping on neck pain in cervical spondylosis
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Introduction: Cervical spondylosis is one of the common causes of chronic neck pain. This study aimed to evaluate the comparative effectiveness of fire cupping therapy versus electroacupuncture on reducing pain and improving cervical spine range of motion in patients with neck pain due to cervical spondylosis.

Methods: Eighty-two participants with neck pain caused by cervical spondylosis were randomly allocated in 1:1 ratio to either the fire cupping (FC) or electroacupuncture (EA) group. Both groups received treatment at EX-B2, A-shi, and GB21 acupuncture points. The two-week study assessed pain levels using the Visual Analog Scale (VAS) at 2 points in time post-intervention and evaluated adverse effects weekly.

Results: After 2 weeks of intervention, VAS scores significantly decreased in both the FC group (from 6 (6–7) to 3 (2–3)) and the EA group (from 6 (6–7) to 2 (1–3)) ($p<0.001$). However, inter-group pain relief was not statistically significant ($p = 0.5794$, Cohen's $d = 0.12$; 95% CI [-0.31–0.6]). Both groups showed statistically significant ROM improvement ($p<0.001$), though the EA group demonstrated better improvement in flexion, extension, and left/right lateral flexion ($p<0.05$). No adverse effects of FC were reported.

Conclusions: FC appears to be an effective and safe therapy for neck pain due to cervical spondylosis, showing similar pain relief efficacy with no statistically significant difference compared to electroacupuncture despite a lower treatment dosage. However, due to methodological limitations, these findings should be interpreted with caution and warrant further validation in rigorously designed studies.

Keywords: Cupping therapy; cervical spondylosis; neck pain; Visual Analog Scales.

1. Introduction

Neck pain (also known as cervical spine pain or cervicalgia) is a common symptom that everyone experiences at least once in their lifetime, affecting both males and females across all age groups [1] [2, 3]. The global prevalence of neck pain ranges from 30% to 50%, with approximately half of the cases progressing to chronic pain. It ranks as the fourth leading cause of disability worldwide [4]. Although not life-threatening, unmanaged cervicalgia can cause disability, increase the economic burden on patients and significantly affect quality of life by contributing to depression, anxiety, and insomnia [5, 6].

Cervical spondylosis is one of the most common causes of chronic neck pain [7]. Conventional treatment modalities typically include physical therapy and pharmacological

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interventions such as analgesics, nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants [8, 9]. However, the condition tends to be recurrent, and long-term use of these medications may lead to undesirable side effects on the gastrointestinal tract, kidneys, and cardiovascular system [10]. Thus, there is an increasing tendency among patients to seek non-pharmacological treatment methods that are both effective and safe.

Recent clinical studies have shown that electroacupuncture (EA) and fire cupping (FC) therapy can help relieve pain, improve joint mobility, and are associated with few adverse effects, particularly in patients with neck pain secondary to cervical spondylosis. FC therapy has been shown to increase cutaneous temperature, enhance local control of blood flow, improve levels of oxyhemoglobin and deoxyhemoglobin, regulate immune function, reduce IgE and IL-2 levels, and reduce inflammatory responses. These mechanisms contribute to the observed analgesic and functional improvements of FC [11].

Acupuncture is a proven effective and safe therapy for pain management. Specifically, this method has been shown to be effective and safe for chronic migraine treatment, even outperforming topiramate. For chronic neck pain, acupuncture is notable for the ability to reduce pain intensity and associated symptoms. Furthermore, in acute pain management, classical acupuncture is considered more effective (faster and longer-lasting) at reducing pain than analgesics like ibuprofen [12-14]. However, studies supporting the analgesic effects of FC therapy remain limited. This study was conducted to evaluate the pain-reducing effects and safety of FC therapy compared to EA in managing neck pain caused by cervical spondylosis, hypothesizing its non-inferiority. Ultimately, we aimed to provide an effective non-pharmacological treatment option to enhance therapeutic outcomes and improve the quality of life for patients.

2. Materials and methods

2.1. Study design and participants

This study was designed as a randomized, controlled, open-label, two-arm parallel clinical trial. Outpatients with neck pain were recruited at Le Van Thinh Hospital in Ho Chi Minh City from February 2025 to May 2025. The study was registered in ClinicalTrials under ID NCT06893185 (URL: https://clinicaltrials.gov/study/NCT06893185). No significant changes were made to the original study protocol after trial commencement. All subjects were informed about the procedures of the study and signed a consent form before any procedure.

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The study adhered to the Standards for Reporting Interventions in Clinical Trials of Cupping (STRICTOC), an extension of the Consolidated Standards of Reporting Trials (CONSORT) guidelines [15] (Appendix 1), and was reported following the updated CONSORT 2025 statement for randomized trials [16] (Appendix 2).

Participants enrolled in the study were required to meet all the following criteria: (1) aged between 20 and 60 years[17-19]; (2) formal diagnosis of cervical spondylosis (*clinical symptoms:* Non-radiating mechanical neck pain that worsens with movement and improves with rest; *paraclinical criteria*: At least one of the following imaging findings: cervical spine X-ray (AP, lateral, and oblique views) and/or cervical MRI showing signs of cervical spondylosis, as confirmed by a radiologist); (3) current episode of neck pain less than 4 weeks on a background of chronic cervical spondylosis; (4) pain intensity score between 3 and 8 on the Visual Analog Scale (VAS); and (5) voluntary consent to participate in the study.

Exclusion criteria included any of the following: (1) neck pain due to other specific causes; (2) loss of physiological cervical curvature or cervical deformities; (3) history of cervical trauma, vertebral fractures, cervical spine surgery, congenital spinal abnormalities, or systemic musculoskeletal disorders; (4) prior treatment with cupping therapy, topical applications, herbal steaming, or use of analgesics or muscle relaxants within 1 week before enrollment; (5) psychiatric disorders or impaired consciousness; (6) presence of pacemakers or metallic implants such as screws or plates; and (7) current use of anticoagulants or presence of bleeding disorders [17-20].

2.2. Sample size and sampling

The minimum sample size n was calculated using the formula for comparing two means:

$$n \geq n_1 + n_2$$

$$n_1 = n_2 \geq \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2(\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

Where:

- $Z_{1-\frac{\alpha}{2}}$ and $Z_{1-\beta}$ are the standard score for the corresponding probability of type 1 and type 2 errors;
- μ is the VAS mean score of each population;
- σ is the VAS standard deviation of each population.

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According to the study by Hu [21], the post-treatment VAS score after electroacupuncture was 3.53 ± 1.6, while the study by Tausif [19] reported a post-treatment VAS score of 2.36 ± 1.47 after cupping therapy. After performing the sample size calculation with a type I error of 0.05 and a type II error of 0.1, and accounting for a potential 10% data loss, a total of 82 patients were required for the study.

2.3. Intervention

Patients were randomly assigned to either the FC group or the EA group in a 1:1 ratio. The random allocation sequence was generated by the principal investigator using computer-generated random numbers. The assignment sequence was concealed from the researchers who enroll participants and administer interventions by using numbered slips of paper from 1 to 82; participants were assigned to a group based on the number they drew.

The electroacupuncture procedure

In the EA group, patients received EA at the Huatuojiaji (EX-B2), A-shi, and Jianjing (GB21) (Table 1) according to the WHO Standard Acupuncture Point Locations in The Western Pacific Region [22].

Table 1. Acupoint locations and their effects

Acupuncture Point	Location	Effects
A-shi	A-shi points are the locations where the patient experiences pain upon palpation.	Promote Qi circulation, activate blood, and relieve pain
Huatuojiaji (EX-B2, C4-C7)	On both sides of the cervical spine, 0.5 cun lateral to the lower border of the spinous processes of the cervical vertebrae from C4 to C7.	
Jianjing (GB21)	In the posterior region of the neck, at the midpoint of the line connecting the spinous process of the seventh cervical vertebra (C7) with the lateral end of the acromion	

Eligible patients received EA once daily, five days per week on a weekday basis, for two consecutive weeks. Each EA session lasted 20 minutes. Sterile single-use acupuncture needles (0.30 mm in diameter, 25 mm in length, Khanh Phong brand, Vietnam) were inserted

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into the skin at a depth of 0.4 to 1 cm. Acupuncture procedures were performed by licensed traditional medicine doctors with a minimum of 5 years of clinical experience.

The acupuncturist stimulated the needle until the patient experienced the 'Deqi' sensation (a moderate stretching, heaviness, and no pain at the acupuncture points). After that, the acupoints were stimulated using the KWD-808I electroacupuncture device. The frequency was adjusted to 100 Hz, and the intensity gradually increased from 1 to 100 μA, depending on the patient's tolerance.

The fire cupping procedure

In the FC group, patients underwent FC therapy with cups fixed on the skin over the same acupoints (Huatuojiaji (EX-B2), A-shi, and Jianjing (GB21)) for 15 minutes per session, once every three days over a two-week period. Six to eight glass cups were used, with a mouth diameter of 5.2 cm, body diameter of 6.3 cm, and height of 6 cm.

The FC procedure is as follows: (1) Soak a cotton swab in alcohol and ignite it, (2) quickly place the burning cotton swab inside the cup and then remove it, (3) place the cup on the area of the skin containing the acupuncture points, (4) remove the cup after 15 minutes. (Figure. 1)

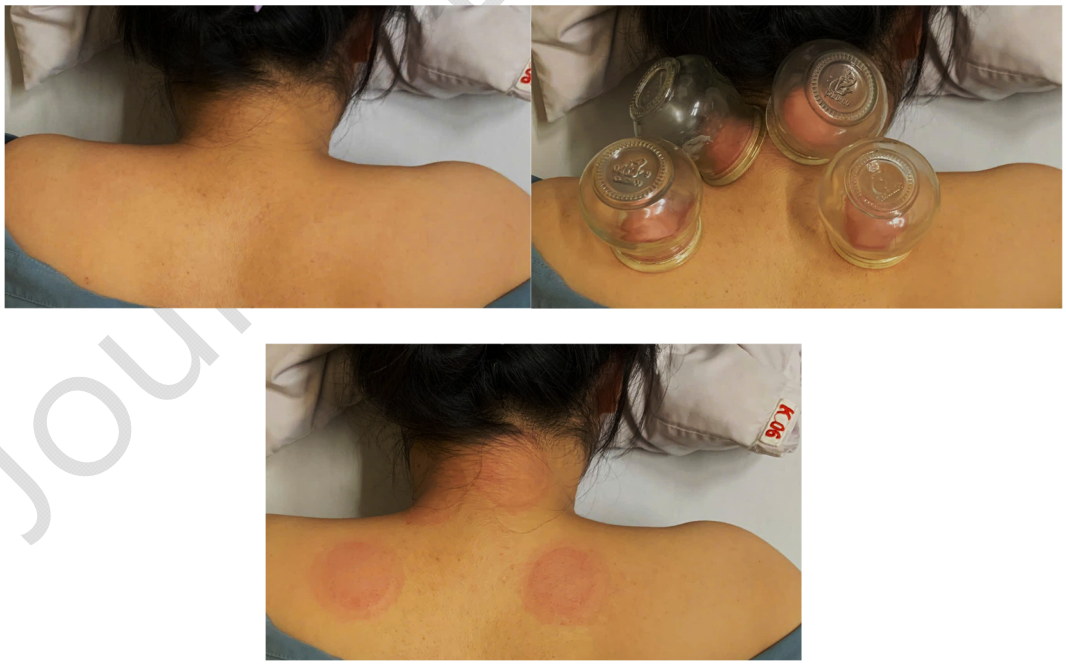

Figure.1. Dry cupping therapy

Before the intervention, patients were clearly explained about the study, the guidelines during the intervention, and throughout the study period. Patients were also provided the

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contact information from researchers to self-report any adverse effects. Dry cupping procedures were performed by licensed traditional medicine doctors.

We selected Huatuojiaji (EX-B2), A-shi, and Jianjing (GB21) as treatment acupuncture points because these points are located in the neck and are commonly reported as pain areas by patients. These painful points are also used in traditional Vietnamese medicine to treat neck pain conditions.

During the EA and FC interventions, patients were positioned in a prone posture, exposing the cervical region, ensuring a comfortable position that does not cause any discomfort throughout the duration of the procedure.

Lifestyle modification guidance was also provided to all participants. Patients were instructed on proper posture in daily activities, including avoiding prolonged static neck positions, alternating between work and rest, using a small pillow to support the natural curve of the cervical spine when lying down, avoiding high pillows, and preventing neck or head trauma. Occupations that require bearing loads with the head or shoulders were also encouraged to take a hiatus.

2.4. Outcome measurement

Pain relief effectiveness was assessed using the Visual Analog Scale (VAS) score and active range of motion (AROM) of the cervical spine, with evaluations conducted at 1-week (T1) and 2-weeks (T2) post-intervention.

VAS Score

The Visual Analog Scale (VAS) is a widely used tool in clinical research to assess the intensity of various symptoms, particularly pain [23]. It consists of a 10-centimeter straight line, with one end (0 cm) representing "no pain" and the other end (10 cm) indicating "unbearable pain." To evaluate pain, patients are asked to mark a point on the line that corresponds to their perceived pain intensity.

Active range of motion of the cervical spine

AROM is measured using a goniometer. During measurement, the patient sits upright with hips and knees flexed at 90 degrees, both feet flat on the floor, and arms relaxed alongside the body. Cervical spine movements include flexion, extension, left and right lateral flexion, and left and right rotation.

Adverse events

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Adverse events were monitored and assessed in the FC group, including potential issues such as burns or intolerable sensations of tightness, pain, or burning.

2.5. Statistical method

Data were entered and managed using Microsoft Excel. Statistical analyses were conducted using STATA version 14.0. The normality of quantitative variables was assessed using the Shapiro-Wilk test. Quantitative variables were described as mean and standard deviation for normally distributed data, or median and interquartile range (IQR) for non-normally distributed data. Differences between groups were assessed using the independent t-test for normally distributed variables or the Mann–Whitney U test for skewed data. Qualitative variables were presented as frequency and percentage, with group comparisons performed using the chi-square test (χ^2) or Fisher's exact test when any expected cell count was less than 5. A p-value of less than 0.05 was considered statistically significant. No subgroup, meta-regression, or sensitivity analyses were performed in this study.

3. Results

3.1. Characteristics of participants

A total of 85 patients were approached, of whom 3 declined to participate. All patients who met the inclusion criteria agreed to participate in the study. (Figure. 2)

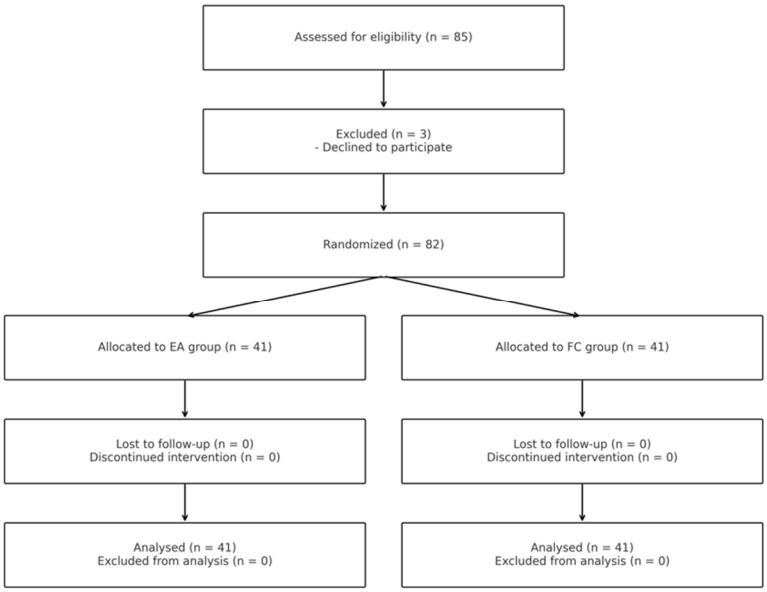

Figure.2. The study flow chart

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The baseline clinical and demographic characteristics of the two groups were comparable, with no statistically significant differences observed. (Table 2)

Table 2. Baseline characteristics of study participants

	EA Group (n=41)	FC Group (n=41)	P value
Sex, n (%)			
Female	31 (75.61)	28 (68.29)	0.461*
Male	10 (24.39)	13 (31.71)	
Age (mean±SD)	49.85 ± 6.94	48.83 ± 8.25	0.545#
Age group, n (%)			
< 45 ages	10 (24.39)	11 (26.83)	0.8*
≥ 45 ages	31 (75.61)	30 (73.17)	
Career, n (%)			
Heavy labor	13 (31.71)	16 (39.02)	0.716*
Light labor	21 (51.22)	20 (48.78)	
Other	7 (17.07)	5 (12.20)	
Duration of illness, n (%)			
< 6 months	9 (21.95)	13 (37.71)	0.449*
≥ 6 months	32 (78.05)	28 (68.29)	
VAS, median (IQR)	6 (6 – 7)	6 (6 – 7)	0.496**

IQR: Interquartile range

* Fisher's test

** Mann-Whitney test

Independent t-test

3.2. VAS scores

A trend of decreasing VAS pain scores over time was observed in both groups ($p < 0.001$) after 1 week and 2 weeks of intervention. After the first week, EA and FC groups showed statistically insignificant differences between groups ($p = 0.4946$, Cohen's d effect size for change in VAS score = 0.15; 95% [CI] -0.28 – 0.58). In the 2nd week, reduced VAS scores

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were statistically insignificant differences between groups (p = 0.5794, Cohen's d effect size for change in VAS score = 0.12; 95% [CI] -0.31 – 0.6).

Although both groups had a median reduction in VAS pain score of 4 after 2 weeks compared to baseline (T0), the FC group showed a distribution of scores ranging from 3 to 5, while the EA group had a distribution from 4 to 5. (Table 3)

Table 3. Comparison of VAS score changes between groups and within-group outcomes before and after treatment

	EA Group (n=41)			FC Group (n=41)			P2
	Median (IQR)	**Δ**	**P1**	**Median (IQR)**	**Δ**	**P1**	
Baseline	6 (6 – 7)			6 (6 – 7)			
T1	4 (3 – 5)	3 (2 – 3)	<0.001	4 (4 – 5)	2 (2 – 3)	<0.001	0.495
T2	2 (1 – 3)	4 (4 – 5)	<0.001	3 (2 – 3)	4 (3 – 5)	<0.001	0.580

Δ: Within-group differences over time compared to baseline

P1: Paired Wilcoxon test compares the change in each group over time with T0

P2: Mann-Whitney test compares the change (Δ) between 2 groups at each time point

IQR: Interquartile range

3.3. Active range of motion of the cervical spine

At baseline, there were no statistically significant differences between the EA and FC groups across all six directions of cervical spine AROM, including flexion, extension, lateral flexion, and rotation (all p > 0.05).

At T1, the EA group resulted in a greater degree of improvement in flexion compared to the FC group (p = 0.0248, Cohen's d effect size = 0.8; 95% [CI] 0.35–1.25). A significant difference was also observed in extension (p = 0.0077, Cohen's d effect size = 0.09; 95% [CI] -0.35 – 0.52), while improvements in lateral flexion and both rotation directions did not reach statistical significance at this point (all p > 0.05).

By T2, the difference between-group became more pronounced. The EA group resulted in a greater degree of improvement in flexion (p = 0.0001, Cohen's d effect size = 0.62; 95% [CI] 0.18–1.06) and extension (p = 0.0005, Cohen's d effect size = -0.02; 95% [CI] -0.46 – 0.41) than the FC group. Additionally, statistically significant differences were observed in

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both left and right lateral flexion (p = 0.0001 and p = 0.0034, respectively; Cohen's d effect size = 0.17; 95% [CI] -0.26 – 0.60 and Cohen's d effect size = 0.19; 95% [CI] -0.24 – 0.63), suggesting moderate to large treatment effects. Although both groups improved in left and right cervical rotation, the between-group differences remained statistically non-significant (p = 0.0719 for both sides; Cohen's d effect size = 0.34; 95% [CI] -0.10 – 0.77 and Cohen's d effect size = 0.31; 95% [CI] -0.12 – 0.75), indicating similar progression over time in this domain (Table 4).

Table 4. Comparison of cervical range of motion changes between groups and within-group outcomes before and after treatment

	Variable	EA Group (n=41)		FC Group (n=41)		P2
		Median (IQR)	Δ	Median (IQR)	Δ	
Flexion	**Baseline**	35 (35 – 40)		35 (35 – 38)		0.929
	T1	40 (38 – 45)	5 (3 – 5)	40 (38 – 40)	3 (0 – 3)	0.025
	T2	45 (43 – 45)	7 (5 – 10)	43 (40 – 43)	5 (3 – 5)	<0.001
	P1		<0.001		<0.001	
Extension	**Baseline**	35 (33 – 43)		35 (30 – 35)		0.081
	T1	40 (38 – 45)	5 (2 – 5)	38 (35 – 40)	5 (0 – 5)	0.008
	T2	45 (43 – 45)	8 (2 – 10)	40 (40 – 43)	5 (5 – 8)	<0.001
	P1		<0.001		<0.001	
Left lateral flexion	**Baseline**	35 (33 – 43)		33 (33 – 38)		0.214
	T1	40 (38 – 45)	5 (2 – 5)	40 (35 – 40)	5 (0 – 5)	0.088
	T2	45 (43 – 45)	10 (2 – 10)	40 (40 – 43)	5 (5 – 8)	<0.001
	P1		<0.001		<0.001	
Right lateral flexion	**Baseline**	35 (35 – 38)		35 (33 – 35)		0.192
	T1	40 (38 – 45)	5 (3 – 5)	40 (38 – 40)	5 (0 – 5)	0.071
	T2	45 (40 – 45)	7 (5 – 10)	40 (40 – 43)	5 (3 – 8)	0.003
	P1		<0.001		<0.001	

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Left rotation	**Baseline**	65 (55 – 70)		65 (60 – 70)		0.410
	T1	70 (65 – 75)	5 (5 – 10)	68 (65 – 70)	3 (0 – 8)	0.989
	T2	75 (70 – 75)	7 (5 – 15)	70 (70 – 75)	5 (5 – 12)	0.072
	P1		<0.001		<0.001	
Right rotation	**Baseline**	65 (55 – 70)		65 (60 – 70)		0.448
	T1	70 (65 – 75)	5 (5 – 10)	68 (65 – 70)	3 (0 – 8)	0.584
	T2	75 (70 – 75)	7 (5 – 15)	70 (70 – 75)	5 (5 – 12)	0.072
	P1		<0.001		<0.001	

Δ: Within-group differences over time compared to baseline

P1: Paired Wilcoxon test compares the change in each group over time with T0

P2: Mann-Whitney test compares the change (Δ) between 2 groups at each time point

IQR: Interquartile range

3.4. Adverse events

During the 2-week intervention period, no adverse effects of FC therapy were observed throughout the intervention process, such as burns, feelings of tightness, pain, or unbearable heat.

4. Discussion

4.1. Characteristics of participants

No significant differences were observed in terms of age, gender, occupation, and disease duration between the two groups in this trial. The even distribution between the groups helped reduce potential confounding factors.

The characteristics of the patients participating in our study showed a higher proportion of females than males, with the average age in both groups between 45 and 55 years. In both groups, patients were mostly engaged in light labor (minimal movement, often sitting for work, such as those in clerical or computer-related jobs). Most patients had a disease duration of 6 months or more.

These characteristics align with the study by Lv et al (2018) [24], which investigated the prevalence and risk factors of cervical spondylosis and found that females had a higher

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incidence of cervical spondylosis than males, with the highest prevalence in the 45–60 age group. The study also indicated that individuals who maintained a fixed working posture for 1–2.9 hours were more likely to develop cervical spondylosis.

4.2. Efficacy and safety of fire cupping

The results indicate that both the EA group and the FC group helped reduce neck pain and improve cervical AROM after each week of intervention. When comparing the median VAS pain scores between the two groups at each point in time, no statistically significant difference was found ($p > 0.05$).

The EA group showed better improvement in cervical spine flexion, extension, and left and right lateral flexion compared to the FC group after 2 weeks of treatment ($p < 0.05$).

Although the FC group received a significantly lower treatment frequency (5 sessions in 2 weeks) compared to the EA group (10 sessions in 2 weeks), the pain reduction efficacy, assessed by the Visual Analogue Scale (VAS), showed statistically significant equivalence between the two groups after two weeks of intervention. This finding is particularly notable as it suggests the potential efficacy of cupping therapy in pain management. While the EA group demonstrated better improvement in cervical spine Range of Motion (ROM), which could partly be attributed to the higher treatment "dosage", the comparable pain-reducing effect of cupping with fewer sessions highlights its potential as a time-efficient and cost-effective non-pharmacological option for neck pain due to cervical spondylosis. The reduced frequency directly translates into fewer patient visits, potentially leading to lower overall treatment costs and less disruption to patients' daily lives, compared to the more intensive daily sessions required for EA.

Studies by Xu (2019) [25], Kim (2018) [26], and Tausif (2017) [19] also showed that cupping effectively reduces pain, performing better than no treatment and demonstrating similar results to active treatments. Additionally, a study by Kim (2018) [26] found that cupping therapy helps improve cervical spine ROM more effectively than no treatment, and its effects are comparable to those of active treatment.

Our study found that both FC and EA help reduce neck pain and improve cervical ROM caused by cervical spondylosis. According to traditional Chinese medicine, neck pain conditions like those in cervical spondylosis are often attributed to the invasion of external pathogenic factors, particularly wind, cold, and dampness, which obstruct meridians, lead to qi and blood stagnation. This blockage of qi and blood disrupts the balance of yin and yang,

manifesting as pain. FC therapy, by creating negative pressure and applying heat, warms the affected areas, dispels cold and dampness, promotes blood circulation, resolves qi and blood stagnation, and unblocks meridians, thereby restoring the balance of yin and yang. This makes it particularly suitable for cold-related syndromes or conditions primarily characterized by qi and blood stagnation [27].

From a modern medical perspective, several studies have demonstrated that the application of cupping leads to physiological changes that contribute to its therapeutic effects. When cups are applied to the skin, the negative pressure stretches the skin and underlying tissues, increases surface temperature, and dilates superficial capillaries, significantly enhancing local blood flow. This increased microcirculation improves the transport of blood and oxygen to the affected area (leading to increased levels of oxyhemoglobin and deoxyhemoglobin), which facilitates tissue healing and pain reduction. Additionally, cupping therapy has been shown to modulate immune function, including reducing levels of IgE and IL-2, and diminishing inflammatory responses [28]. These combined traditional and modern mechanisms are proposed to underpin the observed analgesic and functional improvements in patients with neck pain due to cervical spondylosis.

However, the EA group demonstrated more stable and consistent pain reduction, as well as better improvement in cervical spine ROM compared to dry cupping. Despite this, EA has some drawbacks. It is an invasive therapy with a higher risk of adverse events, such as needle breakage, needle shock, bleeding, or hematoma. Patients must attend daily treatments, leading to time and cost burdens, and it is not suitable for those with needle phobia or those using pacemakers. On the other hand, although FC may not provide effective pain reduction and cervical ROM improvement as EA, it is an ideal option for patients with needle aversion. This method only affects the skin's surface, reducing the risk of adverse events. Additionally, patients do not need to attend daily treatments, which help save on travel and treatment costs.

Our study has several limitations. Firstly, this was an open-label study without blinding of participants or practitioners. This methodological limitation carries a high risk of bias from patient and practitioner expectations due to the inherent unblindability of distinct interventions. This could have influenced subjective outcomes like VAS scores. In addition, a significant limitation was the disproportionate treatment 'dosage' between the two intervention groups. This substantial disparity in intervention intensity and frequency presents a major challenge for a direct comparison of efficacy between the two methods, and

findings regarding comparative effectiveness must be interpreted with extreme caution. Secondly, while VAS score and ROM are commonly used and accepted indicators, the absence of broader, validated 'gold standard' tools for comprehensively assessing functional disability (such as NDI) and health-related quality of life (such as SF-36) limited the overall depth of our findings. Furthermore, given the repeated measurement of outcomes, using repeated measures ANOVA could have provided a more detailed analysis. However, due to the non-normal distribution of some variables, we opted for non-parametric tests to maintain consistency. Future studies could explore data transformation or alternative methods to utilize such robust analyses. Finally, our study only assessed the effect after 14 days of intervention, coupled with a relatively small sample size. This limits conclusions on long-term efficacy, sustainability of improvements, or broad generalizability. Future studies should address these limitations by employing more robust designs, extended follow-up periods, larger sample sizes, and integrating comprehensive and validated tools to provide a more complete understanding of the therapeutic impact and confirm these findings.

5. Conclusion

Our study provides additional evidence regarding the effectiveness and safety of FC in the treatment of cervical spondylosis. The results indicate that FC is effective and safe for patients with neck pain due to cervical spondylosis. Despite receiving considerably lower treatment frequency, FC demonstrated a similar level of pain relief with no statistically significant difference compared to EA. This suggests its high efficiency. This finding opens the possibility of using FC as a particularly efficient and viable alternative to EA, especially for patients who have concerns about the use of acupuncture needles or have limited time for frequent sessions. However, due to methodological limitations such as the open-label design and the disproportionate treatment 'dosage' between groups, the observed effects should be interpreted with caution, and further well-designed studies are needed to confirm these findings and establish definitive comparative efficacy.

SUPPLEMENTARY INFORMATION

Appendix 2. STRICTOC checklist.

Appendix 3. CONSORT 2025 checklist.

LIST OF ABBREVIATIONS

EA	Electroacupuncture

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FC	Fire Cupping
GB	Gall Bladder
IL	Interleukins
IQR	Interquartile range
NSAIDs	Non-steroidal anti-inflammatory drugs
ROM	Range of motion
STRICTOC	The Standards for Reporting Interventions in Clinical Trials of Cupping
VAS	Visual analog scale

ETHICAL STATEMENT

All participants received an informed consent form (ICF) before joining the study. The study officially began once the patients signed the ICF.

The study was approved by the Ethics Committee of the University of Medicine and Pharmacy, Ho Chi Minh City, according to Ethics Approval Decision No. 3563/ĐHYD-HĐĐĐ (Appendix 1). The research was conducted according to the Declaration of Helsinki and the Good Clinical Practice Guidelines, as well as the Standards for Reporting Interventions in Clinical Trials of Cupping (STRICTOC) (Appendix 2), an extension of the Consolidated Standards of Reporting Trials (CONSORT) guidelines and was reported following the updated CONSORT 2025 (Appendix 3) statement for randomized trials.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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